

CURRICULUM FOR THREE YEAR
(SIX SEMESTER)
DIPLOMA COURSE IN

=====
: TEXTILE CHEMISTRY :
: Effective from Session :
=====

=====
:Semester System :
=====

Prepared By

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: Curriculum Development Cell :
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INSTITUTE OF RESEARCH DEVELOPMENT
& TRAINING, U.P., KANPUR

APPROVED BY

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: BOARD OF TECHNICAL EDUCATION :
: U.P. LUCKNOW, :
:CORRECTED AS SYLLABUS COMMITTEE OF:
: B.T.E. MEETING HELD ON 16.06.2017:
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Approved and Corrected by BTE on Dated 16.06.2017

STUDY AND EVALUATION SCHEME FOR
THREE YEARS (SIX SEMESTER) DIPLOMA COURSE IN TEXTILE CHEMISTRY
(To Be Effective From)

I Semester (Common With Textile Technology)

Curriculum						Scheme of Examination									
Periods Per Week						S U B J E C T	Theory				Practical			Grand	
Le	Tut	Dr	Lab	Work	Tot		Examination	Sess.	Total	Examination	Sess.	Total	Tot		
c.	ori	aw	Shop	al		Dur.	Marks	Marks	Dur.	Marks	Marks	Marks	al		
4	-	-	-	-	4	1.1 Foundational Communicaton	2.5	50	20	70	-	-	-	70	
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 General Mechanical Engg.	2.5	50	20	70	3	40	20	130	
-	-	14	-	-	14	1.5 Engineering Drawing	3.0	50	20	70	-	-	-	70	
16	2	14	4	-	36	<-----TOTAL----->	-	250	100	350	40	20	60	410	
Games/NCC/Social and Cultural Activities + Discipline (15 + 10)													25		
TOTAL													435		

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	130
6	-	-	4	-	10	2.3 Applied Chemistry	2.5	50	20	70	3	40	20	130
3	-	-	3	-	6	2.4 Textile Fibres	2.5	50	20	70	3	60	30	160
5	-	-	-	-	5	2.5 Textile Manufacturing Processes	2.5	50	20	70	-	-	-	70
-	-	-	-	14	14	2.6 Workshop Practice	-	-	-	-	4	60	30	90
21	2	11	14	14	48	<-----TOTAL----->	-	250	100	350	200	100	300	650
Games/NCC/Social and Cultural Activities + Discipline (15 + 10)													25	
TOTAL													675	

- 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.

STUDY AND EVALUATION SCHEME FOR
THREE YEARS (SIX SEMESTER) DIPLOMA COURSE IN TEXTILE CHEMISTRY
(Effective From)

III Semester

Curriculum								Scheme of Examination								
Periods Per Week								Theory				Practical				Grand
Le	Tut	Dr	Lab	Work	Tot	S U B J E C T										
c.	ori	aw	Shop	al		Examination	Sess.	Total	Examination	Sess.	Total	Tot				
al						Dur.	Marks		Dur.	Marks		al				
6	2	-	-	-	8	3.1 Fabric Structure & Analysis	2.5	50	20	70	--	--	70			
5	-	-	2	-	7	3.2 Electrical Technology & Electronics	2.5	50	20	70	3	40	130			
6	2	-	6	-	14	3.3 Technology of Bleaching	2.5	50	20	70	6	40	130			
6	2	-	6	-	14	3.4 Physical Chemistry	2.5	50	20	70	6	40	130			
23	6	-	14	-	43	<-----TOTAL----->	--	200	80	280	--	120	460			
												Games/NCC/Social and Cultural Activity/Community Development+Discipline (15+10)	25			
												Aggregate	485			

IV Semester

4	-	-	-	-	4	4.1 Founctional Communicaton	2.5	50	20	70	-	--	70
4	-	-	-	-	4	4.2 Industrial Safety	2.5	50	20	70	--	--	70
4	1	-	6	-	11	4.3 Textile Testing	2.5	50	20	70	6	40	130
2	-	-	5	-	7	4.4 Introduction To Computer	--	--	--	3	60	30	90
5	1	-	-	-	6	4.5 Organic Chemical Technology	2.5	50	20	70	--	--	70
5	-	-	6	-	11	4.6 Technology of Dyeing-I	2.5	50	20	70	6	40	130
3	-	-	2	-	5	4.7 Energy Conservation	2.5	50	20	70	3	20	100
27	2	-	19	-	48	<-----TOTAL----->	--	300	120	420	--	160	660
												Games/NCC/Social and Cultural Activity/Community Development+Discipline (15+10)	25
												Aggregate	685

NOTE:-

- (1) Each session will be of 32 weeks.
- (2) Effective teaching will be at least 25 weeks.
- (3) Remaining periods will be utilised for revision etc.
- (4) 4 weeks structured and supervised, branch specific, task oriented industrial/field exposure to be organised after IV Semester. Student will submit a report. There will be 120 marks for this exposure. These marks will be awarded by project examiner in the VI Semester Exam. (Examination marks : 80, Sess. marks : 40). See Annexure - II.
- (5) Field visit and extension lectures are to be organised and managed well in advance at institute level as per need.

STUDY AND EVALUATION SCHEME FOR
THREE YEARS (SIX SEMESTER) DIPLOMA COURSE IN TEXTILE CHEMISTRY
(Effective From)

V Semester

Curriculum						Scheme of Examination									
Periods Per Week						Theory			Practical			Grand			
Le	Tut	Dr	Lab	Work	Tot	Examination	Sess.	Total	Examination	Sess.	Total	Total	Total		
c.	ori	aw	Shop	al		Dur.	Marks	Marks	Dur.	Marks	Marks	Marks	al		
al															
-	-	-	4	-	4	5.1 Integrative Communicaton	--	--	--	3	40	20	60	60	
6	2	-	-	-	8	5.2 Industrial Management & Entrepreneurship Development	2.5	50	20	70	--	--	--	70	
4	-	-	6	-	10	5.3 Technology of Dyeing-II	2.5	50	20	70	4	80	40	120	
4	-	-	6	-	10	5.4 Technology of Textile Printing	2.5	50	20	70	6	80	40	120	
6	2	-	-	-	8	5.5 Textile Processing Chemicals & Auxiliaries	2.5	50	20	70	--	--	--	70	
6	2	-	-	-	8	5.6 Chemistry of Intermediates and Dyes.	2.5	50	20	70	--	--	--	70	
26	6	-	16	-	48	<-----TOTAL----->	--	250	100	350	--	200	100	300	
													25		
													675		

VI Semester

4	-	-	-	-	4	6.1 Environmental Education(*) & Disaster Management	2.5	50	--	--	--	--	--	--
6	2	-	-	-	8	6.2 Technology of Finishing	2.5	50	20	70	--	--	--	70
6	2	-	-	-	8	6.3 Advance Wet Processing & Process Control In Processing	2.5	50	20	70	--	--	--	70
4	2	-	6	-	12	6.4 Introduction To Knitting and Garment Technology	2.5	50	20	70	6	40	20	130
-	-	-	-	10	10	6.5 Project	--	--	--	--	VIVA	100	50	150
-	-	-	-	-	-	6.6 Industrial Training-4 Week	--	--	--	--	VIVA	80	40	120
20	6	-	6	10	42	<-----TOTAL----->	--	200	60	210	--	220	110	330
													25	
													565	
													333	
													819	
													1240	
													2392	

NOTE:- (1) Each period will of 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) Each group of 2 to 3 students may choose one problem from the project paper.
(6) Field visits and Extension lectures at institute level as per need be arranged.
(7) *-After the examination of IV Semester each student will go for Industrial Training of 4 weeks and will submit report deely forwarded by the supervising officer of the concerned industry for assesment by a pannel consisting of one internal examiner and one external.
(8) Sl. No. 3.1 Common to Textile Technology and other disciplines also.
(9) (*) It is compulsory to appear & to pass in examination, But marks will not be included for division and percentage of obtained marks.

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MAIN FEATURES OF THE CURRICULUM

TITLE OF THE COURSE : Diploma in Textile Chemistry
DURATION : Three Year (Six Semester)
PATTERN OF THE COURSE : Semester System
INTAKE : 60
TYPE OF COURSE : Full Time
ENTRY QUALIFICATION : Passed High School With 35% Marks
MODE OF ADMISSION : Through Joint Entrance Examination

LIST OF EXPERTS

List of experts who contributed in the development of the curriculum in Semester System for the Three year (Six Semester) Diploma Textile Chemistry at I.R.D.T., U.P., Kanpur on 13-04-15 are honourable named below :.

1. Shri B. D. Dixit Professor
I.I.C.T., Bhadohi
2. Shri R. K. Srivastava H.O.D.
Govt. Girls Poly., Allahabad
3. Shri D. K. Verma H.O.D.
Govt. Poly. Varanasi
4. Shri C. K. Upadhaya Lecturer (Spinning)
Govt. Poly., Kanpur
5. Shri Pankaj Yadav Professor
I. R.D. T., U.P. Kanpur

List of experts who contributed in the development of the curriculum in Review and Revision for the Three year (Six Semester) Diploma Textile Chemistry at I.R.D.T., U.P., Kanpur on 22 & 23 August 2016 and 19 & 20 September 2016 are honourable named below :.

1. Shri B. D. Dixit Retd. Professor
U.P.T.T.I., Kanpur
2. Shri R. K. Srivastava H.O.D.
Govt. Girls Poly., Allahabad
3. Shri Pankaj Yadav Assistant Director
D.T.E., U.P. Kanpur
4. Shri R. K. Gupta H.O.D./Principal, Govt. Poly., Furrakhabad
5. Shri Ramakant Yadav Manager, New Civil Lines, Kanpur
6. Shri Rainvijay Singh Industrilist, Shop No 7-8, Sai Market
Opposite BDB Green, Lucknow
7. Shri Grish Verma Retd. Assistant Director, NITRA, Kanpur
8. Dr. Alka Ali Professor, U.P.T.T.I., Kanpur
9. Shri Brajesh Mishra Lecturer, Govt. Poly, Mau
10. Shri Pavan Chauraisa Lecturer, Govt. Girls Poly., Allahabad
11. Shri H. K. Shau Lecturer, Govt. Poly., Furrakhabad
12. Shri Himanshu Maurya Lecturer, Govt Girls Poly, Allahabad
13. Shri Rahul Singh Lecturer, Govt. Poly., Kanpur
14. Smt. Anubha Gupta Lecturer, G. P., Kanpur
15. Shri Yogesh Singh Professor, I.R.D.T.U.P., Kanpur

LIST OF EXPERTS

A Curriculum Workshop for Development of Curriculum on the Subject “Energy Conservation” was held on 22nd January, 2018 at NITTTR, Chandigarh. The following participated in the workshop:-

S. No.	Name, Designation and Official address
From Field/Industries/Institutions of Higher Learning	
1.	Shri Jotinder Singh, Engineer-in-Chief(Retd.) Punjab State Power Corpn. Ltd.(PSPCL), Punjab
2.	Shri Punit Sharma, Asstt.General Manager, Electrical & Energy Management, Godrej Appliances Ltd. Mohali, Punjab
3.	Ms. Anu Singla, Associate Professor, Chitkara University, Rajpura, Punjab
4.	Shri Girish Kumar, UP New and Renewable Energy Development Authroity (UPNEDA), Lucknow, U.P.
5.	Sh. Lal Ji Patel, TBO/ CDC Officer, IRDT Kanpur, U.P.
6.	Shri Ravinder Kumar, Research Assistant, IRDT, Kanpur, U.P.
From NITTTR, Chandigarh	
7.	Dr. AB Gupta, Professor & Head, Curriculum Development Centre, Coordinator

REVISION NEED AND CURRICULUM PROFILE

Revision of a curriculum according to need of the time is an essential exercise. It is to weed out the irrelevant and to add afresh timely relevant matter in systematic and cohesive manner. The existing curriculum for Three Year Diploma In Textile Chemistry was in much need of revision since long. Accordingly task has been set on to bring it out in the present form. In the process consideration has been given to topics such as Computer Awareness, Environment Pollution, Entrepreneurship which have caught our considerable attention. Accordingly two new papers viz. Computer App. For Engg. Industrial Safety have been introduced in the second year of the curriculum. Emphasis on entrepreneurship has been given in the paper Industrial Management and Entrepreneurship Development in the final year of the course. Maintaining the relevant and deleting the less important in the present context a balance has been sought by adding new ideas as and where wanted. This has been done by thorough scrutiny of the old curriculum with the help of experts from industry and institutions. Besides it due care has been taken in rearrangement and distribution of subject matter over three year period of course to make it rationally progressive in class room teaching.

In first year of the course all the papers common to other discipline have already been revised. In first year the last two papers viz. Textile Fibres and Textile Manufacturing Processes have been fully revised by enriching and rationally arranging the matter. Also addition of lab work with Textile Fibres is an extra impetus to students learning. The subject matter of the paper General Mechanical Engineering has been made more relevant to the need of textile industry. Addition of lab work with this paper will still more fortify its effect.

Dependence of industry on electrical power makes it imperative to introduce students with handling of electrical machines and instruments. So a new paper Electrical Technology and Electronics with lab work has been introduced in second year of the course.

In the final year of the course a new paper Advance Wet Processing & Process Control In Processing is meant to introduce the students with the new developments in the field of processes and machinery.

Besides this, project work in the final year covers design and development of product, setting up of small unit to encourage entrepreneurship and also rural development, environment pollution to be friendly to nature and society. With all this it is hoped that this new curriculum will rise up to the horizon of expectations of industry.

**1.1 FOUNDATIONAL COMMUNICATION
SECTION "A" (ENGLISH)**

L T P
4 - -

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
Section A English				
1.	PARTS OF SPEECH	12	-	-
2.	VOCABULARY BUILDING	05	-	-
3.	Grammar	15	-	-
4.	DEVELOPMENT OF EXPRESSION (Composition)	12	-	-
Section B Hindi				
5.	Topic 5	2	-	-
6.	Topic 6	5	-	-
7.	Topic 7	5	-	-
56		-	-	-

DETAILED CONTENTS

1. **PARTS OF SPEECH** :
 - a. Noun
 - b. The pronoun : Kinds and Usage
 - c. The adjective : Kinds and Degree
 - d. Determiner : Articles
 - e. The verb : Kinds
 - f. The Adverb : Kinds, Degree and Usage
 - g. Prepositions
 - h. Conjunctions
 - i. The Interjections
 - j. Subject: Verb Agreement (Concord)

2. **VOCABULARY BUILDING** :
 - a. Antonyms and Synonyms
 - b. Homophones
 - c. One word substitutions
 - d. Idioms and Phrases
 - e. Abbreviations

3. **Grammar**

- a. Sentence & its types
- a. Tenses
- b. Punctuations
- c. Active and Passive voice
- d. Transformation of Sentences
- e. Synthesis of Sentences
- f. Direct and Indirect Narrations

4. **DEVELOPMENT OF EXPRESSION (Composition) :**

- a. Paragraph Writing
- b. Essay Writing
- c. Proposal Writing
- d. Letter Writing (Formal, Informal, Business, official etc.)
- f. Report Writing
- g. Note Making
- h. News Making
- i. Application Writing
- j. Minute Writing
- k. Invitation Letter Writing

SECTION "B" (Hindi)

- 5- संज्ञा, सर्वनाम, विशेषण, क्रिया विशेषण, वर्ण समास, संधि, अलंकार, रस, उपसर्ग प्रत्यय।
- 6- पत्र लेखन, निविदा संविदा, दर आमंत्रण (कोटेशन) अपील, स्वतन्त्र अभिव्यक्ति, प्रतिवेदन लेखन, प्रेस विज्ञप्ति।
- 7- वाक्य/वाक्यांश के लिए शब्द, पर्यायवाची या समानार्थी शब्द, विलोम शब्द, अनेकार्थी शब्द, शब्दयुग्म या समुच्चारित शब्द समूह, वाक्य शुद्धि (शुद्ध अशुद्ध वाक्य), मुहावरे एवं लोकोक्तियाँ।

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.	Trigonometry	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, Logarithmic 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 Tangents, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

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 homogeneity of dimensions and applications of homogeneity 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 measurements, accuracy and precision, random and systematic errors, estimation of probable errors in the results of measurement (Combination of errors in addition, subtraction, multiplication and powers). Significant figures, and order of accuracy in respect to instruments,

3. Circular Motion (5 Marks)

Central forces. Uniform Circular motion (Horizontal and Vertical cases), angular velocity, angular acceleration and centripetal acceleration. Relationship between linear and angular velocity and acceleration. Centripetal and 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, Kepler's Law, Escape and orbital velocity, Time period of satellite, Geostationary, 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, Cylindrical), 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 capillary rise method, Equation of continuity ($A_1V_1=A_2V_2$), 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, characteristics 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). Acoustics of building defects and remedy.

1.3 GENERAL MECHANICAL ENGINEERING

L T P
6 - 4

Rationale

For every practising engineer some knowledge of Mechanical Engineering relevant to his discipline is a must. This paper is meant to provide the would be textile technologists elements of mechanical engineering relevant to their work.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Foundations and Installation	8	-	-
2.	Pipe and Pipe Fittings	8	-	-
3.	Bearings and Lubrications	8	-	-
4.	Power Transmission and Material Handling	8	-	-
5.	Couplings, Clutches, Eccentrics and Camps	8	-	-
6.	Fules and Combustion	9	-	-
7.	Thermodynamics	8	-	-
8.	Steam Generation and Steam Generators	8	-	-
9.	Pumps and Air Compressors	8	-	-
10.	Refrigeration and Air-Conditioning	8	-	-
		84	-	56

DETAILED CONTENTS

1. FOUNDATIONS AND INSTALLATIONS:

General principles and considerations for machine foundations, vibrations in machine foundations. Layout of foundation bolts, alignment of machines care and precautions to be used in installation of machines, introduction to Indian Standards on machine foundations. Practice in blue printreading for installtions.

2. PIPE AND PIPE FITTINGS:

Classification of pipes according to materials used, field of application, IS specifications of water, air and steam pipes, various types of pipe fittings and their applications, laying of pipes, cuttings threading and jointing of pipes.

3. BEARINGS AND LUBRICATION:

Various kinds of bearings, bush bearing, ball and roller bearing, thrust bearing and their application in textile machineries. Principle of film lubrication. Various methods of lubrication, lubricants and their properties. Selection of lubricants for various textile machineries.

4. POWER TRANSMISSION & MATERIAL HANDLING:

- (a) Different types of Trolleys used in process house.
- (b) Belt and gear drive.

Types of gears, spur gear, bevel gear, helical gear, worm and worm wheel, rack and pinion.

Power transmission by belt, chain and gears. Gear drive, application of various kinds of gears and drives in textile machinery. Variable speed drives.

5. COUPLINGS, CLUTCHES, ECCENTRICS AND CAMS:

Necessity of coupling, types of couplings, rigid and flexible couplings, universal coupling, fluid coupling. Introduction to common types of clutches, eccentrics and cams, their function and use.

6. FUELS AND COMBUSTION :

Common solid, liquid and gas fuels. Their composition, higher and lower calorific values. Calculation of air required for complete combustion of unit mass/volume. Concept of excess air in boiler furnace combustion. Heat carried away by flue gases. Flue gas analysis by Orsat apparatus. (Simple Numerical Problems)

Idea of specific properties of liquid fuels such as knock resistance (Cetane and Octane numbers). Flash point, Flame point, Solidification point.

7. THERMODYNAMICS:

Concept of thermodynamic systems and surroundings, Work and its relation to heat. First law of thermodynamics and its application to Constant volume, Constant pressure, Constant temperature and adiabatic processes in dealing with gases and vapours. Representation of these processes in P. V. diagram, calculation of work done.

Second law of thermodynamics. Concept of enthalpy, entropy of thermodynamic system. Concept of Heat engine, Heat pump and refrigerator. Carnot cycle efficiency of heat engine, coefficient of performance of refrigerator and heat pump.

Steady state flow process. Its equation and application.

8. STEAM GENERATION AND STEAM GENERATORS:

Idea of steam generation from water at 0°C. Pressure and temperature curve of steam generation. Idea of wet, dry saturated and super heated steam. Saturation pressure, temperature, degree of super heat, Enthalpy, Entropy and specific volume of wet, dry saturated and super heated steam. Use of steam tables for simple calculations. Introduction to water tube, fire tube boilers e. g. Lancashire, Babcock Wilcox, Cochran and Simple vertical boilers. Boilers mountings and accessories. Steam traps, Reducers, Expansion bends. Boilers specification. Equivalent evaporation, Boiler efficiency, Draught, Chimney height, Conditions for maximum draught through chimney. Measurement of steam consumption. Simple numerical problems.

9. PUMPS & AIR COMPRESSORS:

Elementary knowledge of working of reciprocating, Centrifugal and Vacuum pumps, Blowers and Compressors, Fans and Exhausts.

Difference between reciprocating and rotary compressors. Their types and working, Single stage and Multi stage compressors. Power required to drive single stage compressor. Volumetric efficiency and effect of temperature on it. Use of compressed in textile industry.

10. REFRIGERATION AND AIR CONDITIONING:

Meaning of the term refrigeration. Its application, Unit. Refrigeration methods. Bell Coleman air cycle, air refrigerator, Vapour compression refrigeration. Analysis of simple saturated cycle for vapour compression refrigerator.

Characteristics of good refrigerants. Properties of common refrigerants such as NH₃, CO₂, SO₂, Freon-12.

Air Conditioning:

Meaning of the term and its application. Gas and vapour mixture. Dry and wet bulb temperature, Dew-point, Depression of wet bulb temperature and Depression of Dew-point. Saturated air, specific humidity, relative humidity, Absolute humidity. Humid specific volume, Heat enthalpy of moist air. Use of psychrometric charts and tables. Sensible heating and cooling. Humidification. Dehumidification and their methods.

Air conditioning for human comfort. Air conditioning, for summer and winter. Air conditioning round the year, Psychrometric air conditioning. Industrial air conditioning.

GENERAL MECHANICAL ENGINEERING-LAB

- A. Demonstration of the following for study and sketch.
1. (a) Bio Gas Plant.
(b) Wind Mill.
(c) Solar Cooker.
(d) Voltaic Cell Type Soalr Energy Converter.
 2. Key's, Key ways and Splined shaft e.g. Jib head key, Flat key, Saddle key, Woodruff key, Feather key, Pin key, Splined shaft.
 3. Pins- Split pin, Taper cotter type split pin, Cottor pin, Cottor bolts. Foundations Bolts- Lewis rag bolt, Fish tail bolt and Square head bolt.
 4. Friction clutch and Coupling- Cone cluch, Plate cluch (Single Pair); Muffcoupling, Flange coupling, Universal or Hook's joint coupling. Flexible coupling- Belt and Pin Type, Coil spring type.
 5. Bearings- Plane, Bush, Split step bearings, Ball Roller bearings, Thrust bearings.
 6. Gears- Spur gear, Single and Double herical gears, Bevel gears.
 7. Gear Trains- Simple spur gear train, Compound gear train, Epicyclic gear train.
 8. Compressor and Tension helical springs.
 9. Slider Crank Mechanism and Quick Return Mechanism.

Performance Practicals:

10. Deterimination of velocity ratio of a spur gear train.
11. Velocity diagram of a four bar chain mechanism.
12. Performance evaluation of solar cooker.

NOTE:-

Field visits are recomended for equipments not available in the institution such as biogas plant, wind mill, Boilers. No need to purchase them. Models of Boilers may be procured for study purpose.

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 craftsmen 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 perosnnel 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 acquires 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

C O N T E N T S

NOTE : Latest Indian Standards Code of Practice to be followed.

1. Drawing, instruments and their uses. 1 Sheet
 - 1.1 Introduction to various drawing, instruments.
1
 - 1.2 Correct use and care of Instruments.
 - 1.3 Sizes of drawing sheets and their layouts.
2. (a) Lettering Techniques 2 Sheet

Printing of vertical and inclined, normal single stroke capital letters.

Printing of vertical and inclined normal single stroke numbers.

Stencils and their use.
- (b) Introduction to Scales 2 Sheet

Necesssity and use, R F

Types of scales used in general engineering drawing. Plane, diagonal and chord scales.
3. Conventional Presentaion : 1 Sheet

Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts.
4. (a) Principles of Projection 1 Sheet

Orthographic, Pictorial and perspective.

- Concept of horizontal and vertical planes.
- Difference between I and III angle projections.
- Dimensconing techniques.
- (b) Projections of points, lines and planes. 1 Sheet
- 5 (a) Orthographic Projections of Simple Geometrical Solids 2 Sheet
- Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with referance planes.
- (b) Orthographic views of simple composite solids from their isometric views.
- (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 perpendicular 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 drawing should include dimension with tolerance wherever 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.

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	Coverage Time		
		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 $x^2=4ay$, $y^2=4ax$,

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)

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	-
<hr/>		42	14	56

1. Optics (4 Marks)

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Destructive), Diffraction and Polarization (Concept Only), Law of Malus 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)

Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion, Main component of

laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :(4 Marks)

Coulomb's Law, Electric field, Electric potential, Potential energy, Capacitor, Energy of a charged capacitor, Effect of dielectric on capacitors.

5. D.C. Circuits (5 Marks)

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, Magnetic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics (4 Marks)

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

8. Junction Diode and Transistor : (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 velocity 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.

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 T^2 versus l and using the formula $g = 4\pi^2 / \text{Slope of the graph line}$
3. Determine the force constant of combination of springs in case 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 E_1/E_2 of cells by potentiometer.
8. Determination of specific resistance by Carry Foster bridge.
9. Determination of resistivity 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.

2.3 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	Synthetic Materials	6	-	-
		84	-	56

DETAILED CONTENTS:

1. ATOMIC STRUCTURE : (3 MARKS)

Basic concept of atomic structure, Matter wave concept, Quantum number, Haiseberg'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 block elements), Periodic properties : Ionisation potential, electronegativity, Electron affinity.

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, Electrochemical series and its application. Chemical and Electrochemical theory of corrosion, Galvanic Series. Prevention of corrosion by various methods.

6. CHEMICAL KINETICS : (3 MARKS)

Law of mass action, order and molecularity of reaction. Activation energy, rate constants, 1st order reactions and 2nd order reactions.

7. CATALYSIS : (2 MARKS)

Definition Characteristics of catalytic reactions, Catalytic promoters and poisons, 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, Diesel and Petrol), Benzol and Power alcohol. Knocking, Anti-knocking agents, Octane number and Cetane number.

Cracking and its type, Gasolene from hydrogenation of coal (Bergius process and Fischer tropesch'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 Soda lime, Zeolite and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge formation, Corrosion, Caustic embrittlement, priming and foaming in boilers.

Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorination, 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 colloidal 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 hydrophilic and hydrophobic colloids. Protection and protective colloids. Emulsion, Types, preparation, properties and uses. Application of colloids chemistry in different industries.

12. LUBRICANTS :(3 MARKS)

Definition, classification, Necessity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compounds in lubricants, Synthetic lubricants and

cutting fluids. Industrial application, its function in bearing.

13. HYDROCARBONS: (4 MARKS)

- A. Classification and IUPAC nomenclature of organic compounds homologous series (Functional Group)
- B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

14. ORGANIC REACTIONS & MECHANISM: (4 MARKS)

1. Fundamental aspects -

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

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

- B. Mechanism of Substitution reactions; (Nucleophilic) hydrolysis of alkyl halide, electrophilic substitution halogenation, Sulphonation, Nitration and Friedel-Craft reaction.

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

15. POLYMERS : (3 MARKS)

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

2. Thermosetting and Thermoplastic resins -

- 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. SYNTHETIC 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 Phenolphthalein as indicator.
5. To determine the Chloride content in supplied water sample by using Mohr's methods.
6. Determination of temporary hardness of water sample by O-Henry's method.

2.4 TEXTILE FIBRES
(Common with Textile Technology)

L T P
3 - 3

Rationale

Textile Fibre being the primary input to textile industry, any education in the field of textiles remains incomplete with some knowledge of textile fibres, so whether it is textile technologist or textile chemist knowledge of textile fibres is inevitable. The paper aims to expose the vital aspect of subject to the reader.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Introduction	8	-	-
2.	Classification & Sources of Textile Fibres	8	-	-
3.	General Properties of Fibres	8	-	-
4.	Molecular Structural Polymerization	8	-	-
5.	Utilization of Fibres	10	-	-
		42	-	42

DETAILED CONTENTS

1. INTRODUCTION:

(i) Definition of the Terms:

Textile, Fibre, Textile fibre, Staple, Filament, Yarn and thread.

(ii) Characteristics of a good Textile Fibre:

(a) Essential Properties:

Length, Strength, Flexibility, Cohesiveness

(b) Desirable Properties:

Fineness, Resiliancy, Uniformity, Porosity, Lusture, Durability and Commerical availability.

Importance and usefulness of these properties for textile use. Examples of fibres considerably in these properties

2. CLASSIFICATION AND SOURCES OF TEXTILE FIBRES:

2.1 Definition and Classification of textile fibres.

(a) Natural Fibres:

(1) Cellulosic fibres :

(i) Cotton: Varieties of cottons, Harvesting and Ginning

(ii) Bast Fibres: Jute, Hemp, Ramie, Sisal and Flax. Plant harvesting, Retting, Breaking and Scutching.

(2) Protein/Animal Fibre :

(i) Wool: Classification of wool fibres. The major animal fibres - Mohair, Camel hair, Cashmere, Reclaimed fibres.

(ii) Silk: Production of Raw silk, Its physical, chemical and electrical properties and methods of identification, different varieties of silk.

(v) Grading of Natural Fibres.

(b) Man Made Fibres:

Introduction to man made fibres such as Viscose Rayon, Acetate Rayon, Cuprammonium Rayon, Nylons (6 and 66), PET, Polypropylene. Acrylic, Metallic Fibres. General methods of manufacturing man made fibres viz. Wet, Dry and Melt processes in brief.

3. GENERAL PROPERTIES OF FIBRES:(Natural & Man Made)

3.1 Physical properties of fibres length, fineness, crimp, specific gravity, cross sectional shapes, maturity and their importance in their uses.

3.2 Introduction to mechanical properties of fibres: Stress-strain characteristics of various textile fibres. Concept of modulus and Tenacity, Extensibility, Toughness, Work of rupture and Frictional properties.

3.3 Brief introduction to optical and electrical properties of fibres.

- 3.4 Comparison of natural and man-made fibres
- 3.5 Use of optical microscope for fibre identification. Other physical method of identification. Chemical methods of their identification - Staining test and Solubility Test.

- 4. MOLECULAR STRUCTURAL POLYMERIZATION:
 - I. Molecular structure, Structure of textile fiber (Wool, Silk, Cotton, Polyester, Viscon Nylon).
 - II. Method of polymerisation, Criteria of fiber forming polymer.

- 5. UTILISATIONS OF FIBRES:
 - According to their properties Influence of physical and chemical properties of fibres on their usefulness. Chemical and Physical properties of textile fibres. Introduction to degree of polymerisation, Crystalline and Amorphous region.

TEXTILE FIBRES

List of Experiments

1. To distinguish animal fibres from vegetable fibres
 - (i) with an alkali.
 - (ii) with an acid.
2. To distinguish
 - (i) Silk from wool fibres.
 - (ii) Nylon from other fibres.
 - (iii) Polysters from other fibres.
 - (iv) viscose rayon, Cuprammonium rayon and Acetate fibres.
3. To distinguish linen from cotton.
4. To distinguish Orlon Acrylic Fibres from other fibres.
5. To identify textile fibres such as Cotton, Wool, Silk, Jute, Viscos rayon, Polyester, Nylon and Acrylic fibres under microscope and to draw their longitudinal and cross-sectional views.
6. Checking moisture gain of different textile fibres by Shirley moisture meter and by good brand conditioning oven.
7. To check the maturity ratio of cotton fibres by 10% caustic soda solution.
8. To check staple length of textile fibres by hand stapling method.
9. To check trash contents of cotton fibre by Shirley Trash analyser.
10. To identify of textile fibres by
 - (i) Staining Test
 - (ii) Solubility Test.
11. To determine the relative humidity and temperature of room with the aid thermo-hydrograph, whirling hydrometer and dry and wet bulb thermometers.
12. Find out fibre length by Uster stapler.
13. To find out fibre fineness of cotton by A.N. Stapling apparatus.
14. To do qualitative and quantitative estimation of fibres in a

blend.

2.5 TEXTILE MANUFACTURING PROCESSES

L T P
6 - -

Rationale

Aim of this paper is to give new intrants in the field of textiles first hand knowledge of principles and processes involed in the manufacture of fabrics beginning from fibre. It is to facilitate their further studies in the coming years of the course.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Manufacturing of Yarn	30	-	-
2.	Doubling	12	-	-
3.	Reeling	12	-	-
4.	Manufacture of Fabric	30	-	-
		84	-	-

DETAILED CONTENTS

1. MANUFACTURE OF YARN:

Elementary idea of various processes involved in conversion of Fibre into yarn.

(a) Ginning and Mixing:

(i) Object, types and limitations of mixing processes.

(ii) Object and different types of Ginning - Sutibility of various Ginning machines according to quality of fibre.

(b) Blow Room Line:

(i) Necessity of blow room line, Various machines used in blow room line and general idea of different processes completed in blow room line Viz. Openning, Cleaning and Lap formation

(ii) General idea of main defects found in blow room lap.

(c) Carding:

- (i) Main objects, Line diagram of machines and discription of passage of material through Carding machine.
 - (ii) General concept of Card stripping and grinding.
- (d) Draw FrameL\:
- (i) Passage of materials through machines and main functions involved in the processes.
 - (ii) General idea of graduated drafting system used in drawing process.
- (e) Combing:
- Definition and need of combing and preparation of material for combing process.
- (f) Simplex (Fly Frame):
- (i) Object of the process, Passage of material through machines.
 - (ii) Definition of bobbin leading and flyer leading machines.
- (g) Spinning:
- (i) Its objects, Passage of material on machine spindle.
 - (ii) General idea of spinning defects coming in the process.
2. DOUBLING:
- Its objects, type, scope and uses of doubled yarn.
3. REELING:
- Its object, methods and types of doffing styles used in reeling processes. Passage of material through reeling machine.
4. MANUFACTURE OF FABRIC:
- Elementary idea of various processes involved in conversion of yarn into fabric. Viz.
- (a) Winding:
- (i) Its objects , types on basis of machine speed and winding packages . Passage of material through and any

high speed drum winding machine e.g. Rotoconer

(ii) Faults found in winding package.

(iii) General idea of Pirn winding and its need and advantages.

(b) Warping:

Its main objects, general idea of beam and sectional warping machine.

(c) Sizing:

(i) Its main objects, methods of sizing on the basis of drying system used for drying wet yarn and on the basis of amount of size put on yarn.

(ii) Passage of warpsheet through Slasher sizing machine and knowledge of necessary parts of machine.

(d) Drawing-in & Beaming:

Main objects of drawing in and beaming.

(e) Weaving:

(i) Primary, Secondary and Auxillary motions in weaving process (Only name and functions of all motions).

(ii) Passage of warp on loom . Showing all its necessary parts.

(iii) Limitations fo Tappet Shedding, doobby, Shedding, Jacquards Shedding, .

(iv) Name of some modern weaving techniques.

5. SIZING :

Main object and sizing ingrediants.

NOTE:

Numerical problems and detailed description of any machine/mechanism are excluded.

2.6 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 Time		
		L	T	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, Advantage 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.

* The sequence of polishing will be as below:

- i) Abrasive cutting by leather wheel.
- ii) Polishing 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 tolerances.
- 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 tapping the same to create 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 ferrous (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.
- EX-4 Utility article-to preapre a ceiling fan hook.

7. Welding Shop :

- EX-1 Introduction to welding, classification 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 planing/Shaping machine and to plane a Ractangle of cast iron.

(Common To Textile Technology)

L	T	P
6	2	-

Rationale

To a textile technologist "Fabric Structure Analysis" is a case of diagnosing ailments of a sick by a doctor. It improves his insight and experience. So is the rationale of introducing this paper in the curriculum.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Introduction	12	5	-
2.	Twill Weaves	12	5	-
3.	Analysis of Fabrics	12	4	-
4.	Satinweave	12	3	-
5.	Designs	12	5	-
6.	Fabrics	12	3	-
7.	Miscellaneous Weaves	12	3	-
		84	28	-

DETAILED CONTENTS

1. INTRODUCTION:

Introduction to fabric structure. Explanation of woven structure and other fabric structures. e.g. Knitted, Non-woven, Bonded etc.

- i. Definition of Warp and Weft, Ends and Picks. Determination of warp and weft in a given fabric. Design, Repeat of a design, Draft, Lifting or Peg plan and Denting order.
- ii. Types of drafts used in the manufacture of the fabrics.
- iii. Construction of plain weaves on point or graph paper. Relation of draft, design and peg plan.
- iv. Construction of plain weave and its derivatives in the form of simple Matt or Hopsack and Ribbed Structures.

- v. Various Hopsack or Matt weave designs with warp face, weft face and reversible effects.
- vi. Ornamentation of plain fabrics by different methods.

2. TWILL WEAVES:

Construction of Twill weaves and their classification under the following heads.

- i. Continuous regular twills.
- ii. Pointed twills.
- iii. Combined twills.
- iv. Rearranged twills.
- v. Broken twills.
- vi. Fancy twills.
- vii. Herring bone twills.

3. ANALYSIS OF FABRICS:

- i. Analysis of a fabric and its objects. Confirmation of warp and weft and determination of weaving particulars from the given sample of a fabric.
- ii. Procedure for transferring the interlacement of ENDS and PICKS on graph paper for obtaining the design of the given sample of the fabric.

4. SATIN WEAVE:

Characteristics and uses of satin and sateen weaves. Construction of regular and irregular satin and sateen.

5. DESIGN:

Construction of the following design on point paper along with their draft, peg plan, denting order and weaving particulars.

- i. Diamond and Diaper weaves on pointed draft.
- ii. CREPE weaves by different methods and their characteristics.
- iii. Simple Honeycomb, Brighton Honeycomb, Huck-a back, weaves.
- iv. Mockleno weaves.

6. FABRICS :

Calculation of fabric weight (GSM).

7. Miscellaneous Weaves

Design of following weaves only.

- i. Sponge weaves
- ii. Devon huck
- iii. Barley Corn
- iv. Stitched hop-sack
- v. Twilled hop-sack

3.2 ELECTRICAL TECHNOLOGY & ELECTRONICS

(Common To Dairy Engineering, Mechanical Engineering, Textile Technology)

L T P
5 - 2

Rationale :

The superiority of electricity as power over other means in use in home or industry can not be denied. So it is imperative to introduce the mechanical engineering students with electrical machines and their various uses.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Electric Induction	4	-	-
2.	A. C. Theory	6	-	-
3.	Three Phase Circuits	6	-	-
4.	Measurement & Measuring Instruments	10	-	-
5.	Electronics	10	-	-
6.	D. C. Machines	8	-	-
7.	Transformers	6	-	-
8.	Synchronous Machines	6	-	-
9.	Induction Motors	6	-	-
10.	Electro Heating	4	-	-
11.	Electro Plating	4	-	-
-	-	70	-	28

DETAILED CONTENTS

1. ELECTRIC INDUCTION:

Faraday's Laws of electromagnetic induction. Self and mutual induction. Statically and Dynamically induced e.m.f., Lenz's law. Fleming's left hand and right hand rule.

2. A. C. THEORY:

Production of alternating e.m.f. Definition of cycle,

Frequency, Amplitude, Time period, Instantaneous, Average, R.M.S. maximum values of sinusoidal wave. Form factor, peak factor.

Representation of a sinusoidal quantity by a mathematical expression and phasor, phase and phase difference, Relationship of voltage and current for pure resistance, pure inductance and pure capacitive reactance, impedance. Solution and phasor diagrams of simple R.L.C. series and parallel circuits. Active and reactive power. Significance of P.F.

3. THREE PHASE CIRCUITS:

Production of Three phase voltage, advantages of three phase supply. Concept of star and delta connections. Relationship between phase and line values of currents and voltages, Power in three phase circuits, simple numerical problems.

4. MEASUREMENT & MEASURING INSTRUMENTS:

(i) Primary and secondary instruments-Indicating, Recording and Integrated instruments.

(ii) Working principle and construction of the following instruments.

(a) Ammeter & Voltmeter (Moving coil & Moving Iron).
Extension of their ranges.

(b) Dynamometer type wattmeter.

(c) Single Phase A. C. Energy Meter.

(iii) Measurement of power in a single phase and three phase circuits by wattmeter, Use of digital multimeter for measurement of voltage, Current and testing of devices.

5. ELECTRONICS:

Basic idea of semi conductors P & N type. Semi conductor diodes, Zener diodes and their applications in rectifiers. Transistors-PNP and NPN-their characteristics and uses at an amplifier (Brief description only). Principle characteristics and application of SCR. Devices like UJT, FET, DIAC, TRIAC (Brief introduction, Introduction to operational amplifier, Introduction to basic logic gates and microprocessors.

6. D. C. MACHINES:

D. C. Generator:

Working principle, Constructional details, e.m.f. equation, Types of generators and their applications.

D. C. Motor:

Working principle, Back e.m.f., Types of D. C. motor and elementary idea of their characteristics. Torque equation, Methods of speed control (Description Only).

7. TRANSFORMERS:

Working principle and constructional details of a single phase and 3 phase transformers, e.m.f. equation, Losses and efficiency, Cooling of transformers, Elementary idea of auto transformers and welding transformers.

8. SYNCHRONOUS MACHINES:

(a) Alternators:

Working principle, Types of alternators, Constructional details, E.M.F. equation, Condition for parallel operation.

(b) Synchronous Motors:

Working principle, Constructional details, Vector diagram, Effect of excitation on armature current and power factor, Synchronous condenser.

9. INDUCTION MOTORS:

(a) Three Phase Induction Motors:

Working principle and constructional details-Types of induction motors-Slipring and Squirrel cage. Slip in induction motors. Speed torque characteristic, Starting and speed control. Application of induction motors in industry. General faults and their remedies.

(b) Single Phase Induction Motors:

Working principle and constructional details and application of single phase motors (Split phase, Capacitor start and Run Motor). A. C. series motors, General faults and their remedies.

10. ELECTRO HEATING:

Types of electro heating. Brief description of resistance ovens and induction furnace and core furnaces.

11. ELECTROPLATING:

Importance of electroplating, Principle of electroplating and equipment used. Processes used in electroplating, Anodising.

ELECTRICAL TECHNOLOGY & ELECTRONICS LAB

1. To change the speed and direction of rotation of d.c. shunt motor by

- (a) Armature control method.
- (b) Field control method.

2. To change the speed and direction of rotation of d.c. compound motor by

- (a) Armature control method.
- (b) Field control method.

3. To measure the terminal voltage with variation of load current of
 - (a) D.C. shunt generator.
 - (b) D.C. compound generator.
4. To perform load test on a single phase transformer and determine its efficiency.
5. To start and run a induction motor by
 - (a) Star Delta Starter.
 - (b) Auto Transformer Starter.
6. To measure slip of an induction motor by direct loading.
7. To start and change the direction of rotation of an induction motor.
8. To measure transformation ratio of a single phase transformer.
9. To measure power and P.F. in a single phase circuit by Ammeter, Voltmeter and Wattmeter.
10. To measure power and P.F. in a 3 phase/A.C. circuit by two wattmeter method.
11. To calibrate a single phase energy meter at different P.F.'s and different loads.
12. To locate the faults in an electrical machine by a megger.
13. To connect a fluorescent tube and note its starting and running current.
14. To draw characteristics of Silicon Controlled Rectifier (SCR).
15. Testing of electrical devices - Zenor, Diode, Transistor, FET, UJT, SCR.
16. Use of operational amplifier as adder, subtractor, comparator, differentiator and integrators.

3.3 TECHNOLOGY OF BLEACHING

L T P
6 2 6

Rationale :

Bleaching and mercirisation are the processes to improve looks and quality of the textile products. So they are indispensable, their knowledge to students of textile processing is a must.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	General Processes and Equipments	20	8	-
2.	Preparatory Process	9	2	-
3.	Mercerization	15	5	-
4.	Treating Wool, Silk, Synthetic Fibre Fabrics- Material and Equipment Involved	15	5	
5.	Preparatory Machineries & Processing	25	8	
-		84	28	84

DETAILED CONTENTS

1. GENERAL PROCESSES AND EQUIPMENTS:
 - i. Natural and added impurities in cotton, silk, wool, jute, etc. Sequences of preparatory process prior to dyeing for natural and man made fibre.
 - ii. Purpose of singeing and detailed working of gas singeing machine with its advantages and disadvantages.
 - iii. Desizing - Purpose, desizing agents and desizing methods.
 - iv. Scouring chemistry of scouring of cotton.
2. PREPARATORY PROCESS:
 - i. Desizing - Types, Detail study of Enzymatic desizing with its advantages and disadvantages.
 - ii. Scouring - Scouring of cotton, Different methods of scouring

of wool.

3. MERCERIZATION:

Mercerization, Physical and chemical change during mercerization
Process parameter, check the efficiency of mercerization
barium
activating number, Absorbency test.

4. TREATING WOOL SILK AND SYNTHETIC FIBRE FABRIC MATERIAL AND EQUIPMENT INVOLVED:

- i. Carbonising processes for raw wool and woollen fabrics and machines used.
- ii. Scouring processes for greasy wool and machines used. Scouring of woollen yarn and fabric-chemical methods and machines used.
- iii. Description of rope washing and crabbing machines.
- iv. Various theories of milling and description of milling machines.
- v. Degumming of silk.
- v. Concept of heat setting and its application on synthetic fibre/
fabric.

5. PREPARATORY MACHINERIES/PROCESSING:

- i. Brief description and working principle of J-box, Kier, Jigger, Winch
- ii. Bleaching - Bleaching of textile fibre with Hypochlorite, Peroxide and Chlorite bleaching with its advantages and disadvantages.
- iii. Washing- Its importance, Washing range machines.
- iv. Drying- Introduction, Thermal drying-Cylinder drying, Stenter drying and radiation drying.
- iv. Bleaching of various synthetic fibre and their blends
- v. Bleaching of woollen and silk fibres and their blends
- vi. Evaluation of Bleached and scoured fabric.

TECHNOLOGY OF BLEACHING

LIST OF EXPERIMENTS

1. Design of cotton
 - (a) Acid Designing
 - (b) Enzymatic Designing
2. Scouring of cotton in Kier and to estimate scouring loss.
3. Bleaching of cotton with bleaching powder.
4. Bleaching of cotton with sodium hypochloride.
5. Bleaching of cotton with hydrogen peroxide.
6. Mercerisation of cotton.
7. Scouring of wool and silk.
8. Carbonising of wool.
9. Bleaching of wool and silk with hydrogen peroxide sodium hydrosulphite.
10. Bleaching of synthetic fibre with sodium chlorite.
11. Bleaching of blends with sodium chlorite.
12. Application of optical brightening agents on natural and synthetic fabrics.

3.4 PHYSICAL CHEMISTRY

L T P
6 2 6

Rationale :

Knowledge of principles of physical chemistry is useful for textile processing activities for better control and qualities. The paper deals with such principles relevant to activities in textile processing house.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Colloidal Chemistry	12	4	-
2.	pH Value	12	4	-
3.	Catalysts and Catalysis	12	4	-
4.	Law of Mass Action	12	4	-
5.	Chemical Kinetics	12	4	-
6.	Properties of Liquids	12	4	-
7.	Application of Physical Chemistry	12	4	-
-		84	28	84

DETAILED CONTENTS

1. COLLOIDAL CHEMISTRY:

Particle size and colloidal state, Types of colloids, Dispersed phase and dispersion phase. Preparation of colloidal solution by dispersion and condensation methods. Tyndall effect, Brownian movement, cataphoresis, emulsions, Absorption. Application of colloids in industry and in nature.

2. pH VALUE:

Importance of pH value in textile chemistry, measurement of pH value by observation and by pH meter.

3. CATALYST AND CATALYSIS:

Elementary treatment of theories of catalysis. Negative and positive catalysis, Catalytic poisoning. Application of

catalysts in textile industry.

4. LAW OF MASS ACTION:

A detailed study of law of mass action. Application of law of mass action to reactions used in textile chemistry.

5. CHEMICAL KINETICS:

Rate of a reaction, Expressing rate of a reaction, Factors influencing rate of a reaction.

Order of a reaction. Reactions of First, Second and Third order. Methods of determining order of a reaction. Molecularity and temperature dependence of reaction rates. Concept of activation. Catalysis, Influence of catalysts on reaction rates and equilibrium.

Concept of free energy and its application in dyeing and bleaching.

6. PROPERTIES OF LIQUIDS:

Liquids, vapour pressure and its determination, Heat of fusion, heat of vaporization and their relation with vapour pressure.

Surface Tension - Its measurement by

- i. Capillary Rise Methods
- ii. Stalagmo Meter
- iii. Tension Balance Methods.
- iv. Roll Surface in washing

Viscosity:

(i) Temperature dependence of viscosity determination of viscosity by viscometer.

(ii) Roll of viscosity in preparing painting paste.

Refractive Index:

Abbus refractometer.

7. APPLICATION OF PHYSICAL CHEMISTRY:

Its application in various textile chemical processes such as bleaching, dyeing and printing

PHYSICAL CHEMISTRY

LIST OF EXPERIMENTS

1. Determination of surface tension by drop weight method using stalagmometer.
2. Determination of viscosity using ostwalds viscometer.
3. Simple titrations on pH meter.
4. Estimation of the following oxidising agents -
 - i. Bleaching Powder.
 - ii. Sodium Hydrosulphite.
 - iii. Hydrogen Peroxide.
5. Simple volumetric exercise on iodometry and iodimetry.
6. Analysis of acid and alkali.
7. Determination of solid/active content of common finishing agents.
8. Determination of nature of emulsion.

IV Semester

4.1 Functional Communication

L	T	P
4	-	-

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage	Time		
			L	T	P
Section A English					
1.	On Communication	04	-	-	-
2.	Exploring Space	04	-	-	-
3.	Sir C.V. Raman	04	-	-	-
4.	Professional Development	04	-	-	-
5.	Buying a Second Hand Bicycle	04	-	-	-
6.	Leadership and Supervision	04	-	-	-
7.	First Aid	03	-	-	-
8.	The Romanance of Reading	03	-	-	-
9.	No Escape from Computers	03	-	-	-
10.	Bureau of Indian Standards	03	-	-	-
Section B Hindi					
1.	Topic 1	02	-	-	-
2.	Topic 2	02	-	-	-
3.	Topic 3	02	-	-	-
4.	Topic 4	02	-	-	-
5.	Topic 5	02	-	-	-
6.	Topic 6	02	-	-	-
7.	Topic 7	02	-	-	-
8.	Topic 8	01	-	-	-
9.	Topic 9	02	-	-	-
10.	Topic 10	02	-	-	-
11.	Topic 11	01	-	-	-
		56	-	-	-

Section "A" (English)

Text Lessons

Unit I.	On Communication
Unit.II	Exploring Space
Unit.III	Sir C.V. Raman
Unit.IV	Professional Development of Technicians
Unit.V	Buying a Second Hand Bicycle
Unit.VI	Leadership and Supervision
Unit.VII	First Aid
Unit.VIII	The Romanance of Reading
Unit.IX	No Escape from Computers
Unit.X	Bureau of Indian Standards

Section "B" Hindi

- 1- स्वरोजगार
- 2- भारतीय वैज्ञानिकों एवं तकनीकियों का भारत के विकास में योगदान
- 3- ग्राम्य विकास
- 4- परिवार नियोजन
- 5- सामाजिक संस्थायें
- 6- नियोजन और जन कल्याण
- 7- भारत में प्रौद्योगिकी के विकास का इतिहास
- 8- हरित क्रांति
- 9- पर्यावरण एवं मानव प्रदूषण
- 10- श्रमिक कल्याण
- 11- भारत में श्रमिक आन्दोलन

4.2 INDUSTRIAL SAFETY

(Common To Textile Technology)

L T P
4 - -

Rationale

Textile industry is one of the major industries of the country. Its safety problems are much more different than those of others. So it is vital to give youngsters willing to enter into this field, knowledge of general principles of industrial safety focussing on problems in textile industry.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Introduction	8	-	-
2.	Principles of Accident Prevention	8	-	-
3.	Safety Engineering	18	-	-
4.	Sizing Process & Loom Shed Safety, Precaution In Chemical Processes	10	-	-
5	Safety Statutes	12	-	-
		56	-	-

DETAILED CONTENTS

1. INTRODUCTION:

Need for Industrial Safety - Legal Humanitarain, Economic and Social consideration. Safe working conditions and productivity, Unsafe conditions and Hazards. Cost of accidents- Direct or Indirect social cost, financial cost. Role of mangement and workers participation in Industrial Safety. Safety management principles and practices.

2. PRINCIPLES OF ACCIDENT PREVENTION:

Definitions - Accident, Injury, Dangereous occurances, Unsafe acts, Unsafe conditions and hazards. Theories of accidents prevention, Principles and methods of accidents preventions.

3. SAFETY ENGINEERING:

Safe guarding of machines- Statutory provisions related to safe guarding of machinery and working near unguarded machines. Principle of machine guarding. Ergonomics of machine guarding. Types of guards and guarding machines in textile industry. Incidental safety devices. Accidents and hazards. Guarding of machines and safety precautions in Opening, Cleanning, Carding, Drawing, Combing, Fly frame, Ring frames, Rotors (spinning), Winding, Doubling, Warping, Sizing and Weaving operations.

Material Handling:

Ergonomics of material handling, Principles of correct method of lifting objects of different size, shape and weight with safe use of accessories for manual handling.

Safety aspects of design and construction and use of material handling machinery use in textile industry- Lifts, Forks, Motor Trolleys, Over head cranes and Chain Pullies.

Principle of good illumination at work place and its ecommended minimum standard. Lighting and Colour.

Danger From Electricity:

Safe limits of amperage and voltages. Means for cutting over loads and short circuit protection. earth fault protection. Protection of joints and conductors.

Fire explosion, Common cause for industiral fire detection and alarm. Knowledge of water system, Carbon Dioxide System, Foam Extinguishers system and Dry Chemical Extinguishing Systems for extinguishing fire, Sprinklers.

4. SAFETY PRECAUTION IN CHEMICAL PROCESSES:

Bleaching, Dyeing, Printing, Finishing and Accidental hazards. Chemical hazards in wet processing. Effluent in textile processing.

Health and Welfare:

Health hazards in Textile industry. Dust and Fly. Noise generated and control measures. Occupational hazards, Occupational diseases. Personal production equipments. Health and welfare measures e.g First Aid Facilities and other welfare measures Hospital, Clinics. Speical precautions for specific work invironment.

5. SAFETY STATUTES:

Employees welfare and legislation. Indian Boiler Act and Regulation. The Water (Control of Pollution) Act and Rules. The Air (Pollution) Act and Rules.

4.3 - TEXTILE TESTING

(Common To Textile Technology)

L T P
4 1 6

Rationale

As the name implies this paper aims to develop in the incumbent the capability of testing the products and its components for desired results. Without it a product can never be claimed for any standard.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Importance of Textile Testing	8	2	-
2.	Sampling and quality control	8	2	-
3.	Fibre Dimensions	8	2	-
4.	Yarn Dimensions	8	2	-
5.	Fabric Dimensions	8	2	-
6.	Tensile Testing of Textiles	8	2	-
7.	Evenness Testing:	8	2	-
		56	14	84

DETAILED CONTENTS

1. IMPORTANCE OF TEXTILE TESTING:

Introduction to textile testing, properties of fibres, yarns and fabrics and their relevance in assessing the performance, of textiles during and after manufacture.

2. Sampling and Quality Control : Definition of sample, sample size, sampling Technique, Introduction to quality control, Accuracy of measurement, presentation and analysis of data, SQC charts analysis of defects, difference between average and correlation. Standard deviation and coefficient of variation.

3. FIBRE DIMENSIONS:

i. Fibre Length Measurement - Use of Baer sorter,

- Fibrograph, Uster-stapler, their principles of operation.
- ii. Fibre Fineness Measurement - By cutting and weighing method, Sheffield micronair, Aerlometer, Maturity of cotton by caustic soda method and by airflow methods.
 - iii. Role of Humidity - Absolute Humidity, Relative Humidity, moisture Regain, Moisture content.
 - iv. Introduction to H.V.I. (High Volume Instruments)
4. YARN DIMENSIONS:
- i. Measurement of yarn twist by Rock bank twist tester, continuous twist tester and by twist and untwist methods.
 - ii. Measurement of yarn diameter by microscope.
5. FABRIC DIMENSIONS:
- i. Measurement of fabric thickness. Measurement of crimp by crimp tester.
 - ii. Air permeability of fabrics, its measurement by air permeability tester.
 - iii. Crease recovery of fabrics, factors effecting crease recovery, measurements of crease recovery by crease recovery tester.
 - iv. Water repellancy tests.
 - v. Abrasion resistance test on fabric by Mortindale, Abrasion Tester.
6. TENSILE TESTING OF TEXTILES:
- i. Fibre strength testing by Pressely strength tester, stelometer.
 - ii. Yarn strength testing, types of testing machines, single yarn strength testing and Lea strength testing.
 - iii. Fabric strength testing by cut strip, grab strip and revealed strip methods.
 - iv. Fabric tear testing by tongue tear, trapezoid tear test.
 - v. Bursting strength testing by hydraulic strength tester.

7. EVENNESS TESTING

- i. Nature of irregularities - short term, medium term and long term variations, periodic and non periodic irregularities.
- ii. Evenness testing by uster evenness tester and fielden and walker evenness tester.
- iii. Classmate faults and classifaults.

TEXTILE TESTING
LIST OF EXPERIMENT

1. To find the count of yarn
(i) by physical balance
(ii) by yarn quadrants balance.
(iii) by Bessley yarn balance.
and to calculate Coefficient of variation (CV).
2. To calculate yarn count by wrap reel and to calculate C.V..
3. Determine the twist of yarn per inch/per meter in double yarn and its individual components by continuous twist tester and twist and untwist tester.
4. Find out the hank of sliver and roving with the aid of wrap block machine.
5. Find the staple length of fibre by Bare Sorter.
6. Measure fibre fineness by flowing air through a sample of fibre by micronaire.
7. Find out fibre length by analytical digital fibrograph.
8. Find out lea strength of cotton yarn by lea strength tester (Power driven) and CSP.
9. Find the breaking strength of cotton yarn by Ballistic strength testing machine.
10. To find the breaking strength and elongation of single thread of cotton by single thread testing machine (Hand or power driven).
11. Examine the bursting strength of a fabric by bursting strength tester.
12. Find out the relative abrasion properties of fabrics by Martindale abrasion tester.
13. Find the breaking strength of different textile fabrics by means of cloth strength tester (power driven).
14. Measure crimp by Shirley crimp meter.
15. Find out air permeability of fabric by air permeability tester.
16. Measure crease recovery of fabric by crease recovery tester.

17. Find out fibre strength by stelometer.
18. Test of pilling of fabrics by computerzed pilling texter.
19. Estimation of final pH value of finished fabric.
20. Test evenness of the yarn by evenness tester,

4.4 INTRODUCTION TO COMPUTER

[Common with Civil Engg., Civil (Spl. With Rural), Mechanical Engg., (Specialisation in Production, Automobile, Refrigeration and Air conditioning), Electronics Engg., Instrumentation and Control Engg., Dairy Engg., Leather Technology, Footwear and Leather Goods Tech., Cermics, Chemical Engg. (Four year Sandwich), 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 Time		
		L	T	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.

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.

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.

4.5 ORGANIC CHEMICAL TECHNOLOGY

L T P
5 2 -

Rationale

Use of organic compound in textile processes is well known. So the knowledge of organic chemistry with its relevance to textile industry is essential for the personnels concerned.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Organic Compounds	9	5	-
2.	Aliphatic Compounds	16	6	-
3.	Aromatic Compounds	16	6	-
4.	Unit Reactions	9	4	-
5.	Polymers	20	7	-
		70	28	-

DETAILED CONTENTS

1. ORGANIC COMPOUNDS:

Their classification, Systems of nomenclature of

- i. Aliphatic Compounds
- ii. Aromatic Compounds

2. ALIPHATIC COMPOUNDS:

Nomenclatures and classification of compounds, General Method Of preparation and properties of alkane, alkene, alkynes, Halogen derivative, amino compounds, Hydroxy compound, Aldehyde, Ketone and acids.

3. AROMATIC COMPOUNDS:

Classification and system of nomenclature of Aromatic compounds. General methods of preparation. Properties and uses of aromatic hydrocarbons, Halogen derivatives, Hydroxy compounds, Nitro compounds, Sulphuric acid derivatives, Amino compounds, Diazonium compounds, Acids and their important derivatives.

4. UNIT REACTIONS:

Introduction to following reaction and their application in textile chemistry.

- i. Nitration
- ii. Sulphonation
- iii. Halogenation
- iv. Diazotization.

5. POLYMERS:

What is monomer and polymers. Different types of monomer and polymer. Definition of repeat unit, degree of polymerization functionality of monomer. Classification of polymer, molecular mass/ weight of polymer. Glass transition temp (T_g) of polymeric materials.

4.6 TECHNOLOGY OF DYEING-I

L T P
5 - 8

Rationale :

Dyeing is not a new thing to textile industry but the improvements in the process and developments of techniques together make it an interesting case of study. Knowledge of chemicals and techniques used in the process is important for persons concerned.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	History of Dyeing of Textile	2	-	-
2.	Classification of Dyestuffs	2	-	-
3.	Natural Dyes	3	-	-
4.	General Terms In Technology of Dyeing	6	-	-
5.	Dyeing of Textiles	6	-	-
6.	Dyestuffs and Dyeing Mechanism	9	-	-
7.	Basic Dyestuffs	9	-	-
8.	Acid Dyestuffs	9	-	-
9.	Sulphur Dyestuffs	9	-	-
10.	Vat Dyestuffs	9	-	-
11.	Solubilized Vat Dyestuffs	6	-	-
-	-	70	-	112

DETAILED CONTENTS

- HISTORY OF DYEING OF TEXTILE:
Defination and brief history of dyeing of textiles.
- CLASSIFICATION OF DYESTUFFS:
Classification of dyestuffs on the basis of methods of application.
- Application of Natural Dyes in different Textile Fibre.
- GENERAL TERM IN TECHNOLOGY OF DYEING:
General terms and definitions used in technology of dyeing,

Such as dyeing- assistants, mordants, dye-bath, standing bath, levelling agent, liquor ratio, exhaustion, mangle expression.

5. DYEING OF TEXTILES:

Dyeing of Textiles in different forms, i.e. loose fibre in yarn and fabric and machinery/equipment used such as jigger, tensionless enclosed jigger. Hank dyeing machine, winch dyeing machine, package dyeing machine, paddle dyeing machine, molten metal machine, padding mangles.

6. DYESTUFFS AND DYEING MECHANISM

(i) Principles of dyeing and methods of dyeing cotton, wool and silk . After treatments of materials dyed with direct dyestuffs to improve fastness properties.

(ii) Mechanism and method of Dyeing sybthetic fibres and fabries

7. BASIC DYESTUFFS:

Principle of dyeing and methods of dyeing cotton, wool silk and jute.

8. ACID DYESTUFFS:

Principle of dyeing and methods of dyeing wool and silk with acid, acid mordents and metal complex dyes.

9. SULPHUR DYESTUFFS:

Principle of dyeing and methods of dyeing cotton.

A. Defects like Bronziness, Trndering and their Remedies.

B. Soluble Sulpher Dyes - Methods of dyeing cotton.

10. VAT DYESTUFFS:

Principle of dyeing, Classification and methods of deying cotton.

11. SOLUBILIZED VAT DYESTUFFS:

Application to cotton.

TECHNOLOGY OF DYEING-I

LIST OF EXPERIMENTS

1. Demonstration on prescribed machinery, preparation of line diagrams (Given as in theory paper).
2. Dyeing of cotton with direct dyes.
3. After treatments of material dyed with direct dyes.
4. Dyeing of wool and jute with basic dyes.
5. Dyeing of wool and silk with acid dyes.
6. Dyeing of wool and silk with metal complex dyes.
7. Dyeing of wool and silk with acid mordant dyes.
8. Dyeing of cotton with sulphur black dye and after treatment to prevent tendering.
9. Dyeing of cotton with vat dyestuffs (At least three experiments by different methods).
10. Dyeing of cotton with solubilized vat dyes.

4.7 ENERGY CONSERVATION

L T P
3 - 2

RATIONALE

The requirement of energy has increased manifold in last two decades due to rapid urbanization and growth in industrial/service sector. It has become a challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as an additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

DETAILED CONTENTS

1. **Basics of Energy**
 - 1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Capacity factor of solar and wind power generators.
 - 1.2 Global fuel reserve
 - 1.3 Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)
 - 1.4 Impact of energy usage on climate

2. **Energy Conservation and EC Act 2001**
 - 2.1 Introduction to energy management, energy conservation, energy efficiency and its need
 - 2.2 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance. Prominent organizations at centre and state level responsible for its implementation.
 - 2.3 Standards and Labeling
 - 2.3.1 Concept of star rating and its importance
 - 2.3.2 Types of product available for star rating

3. **Electrical Supply System and Motors**
 - 3.1 Types of electrical supply system
 - 3.2 Single line diagram
 - 3.3 Losses in electrical power distribution system
 - 3.4 Understanding Electricity Bill
 - 3.4.1 Transformers Tariff structure
 - 3.4.2 Components of power (kW, kVA and kVAR) and power factor, improvement of power factor

3.4.3 Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC)

3.5 Transformers

- 3.5.1 Introduction
- 3.5.2 Losses in transformer
- 3.5.3 Transformer Loading
- 3.5.4 Tips for energy savings in transformers

3.6 Electric Motors

- 3.6.1 Types of motors
- 3.6.2 Losses in induction motors
- 3.6.3 Features and characteristics of energy efficient motors
- 3.6.4 Estimation of motor loading
- 3.6.5 Variation in efficiency and power factor with loading
- 3.6.6 Tips for energy savings in motors

4. Energy Efficiency in Electrical Utilities

4.1 Pumps

- 4.1.1 Introduction to pump and its applications
- 4.1.2 Efficient pumping system operation
- 4.1.3 Energy efficiency in agriculture pumps
- 4.1.4 Tips for energy saving in pumps

4.2 Compressed Air System

- 4.2.1 Types of air compressor and its applications
- 4.2.2 Leakage test
- 4.2.3 Energy saving opportunities in compressors.

4.3 Energy Conservation in HVAC and Refrigeration System

- 4.3.1 Introduction
- 4.3.2 Concept of Energy Efficiency Ratio (EER)
- 4.3.3 Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems.

5 Lighting and DG Systems

5.1 Lighting Systems

- 5.1.1 Basic definitions- Lux, lumen and efficacy
- 5.1.2 Types of different lamps and their features
- 5.1.3 Energy efficient practices in lighting

5.2 DG Systems

- 5.2.1 Introduction
- 5.2.2 Energy efficiency opportunities in DG systems
- 5.2.3 Loading estimation

6 Energy Efficiency in Thermal Utilities

- 6.1 Thermal Basics
 - 6.1.1 Types of fuels
 - 6.1.2 Thermal energy
 - 6.1.3 Energy content in fuels
 - 6.1.4 Energy Units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE)

- 6.2 Energy Conservation in boilers and furnaces
 - 6.2.1 Introduction and types of boilers
 - 6.2.2 Energy performance assessment of boilers
 - 6.2.3 Concept of stoichiometric air and excess air for combustion
 - 6.2.4 Energy conservation in boilers and furnaces
 - 6.2.5 Do's and Don'ts for efficient use of boilers and furnaces

- 6.3 Cooling Towers
 - 6.3.1 Basic concept of cooling towers
 - 6.3.2 Tips for energy savings in cooling towers

- 6.4 Efficient Steam Utilization

7 Energy Conservation Building Code (ECBC)

- 7.1 ECBC and its salient features
- 7.2 Tips for energy savings in buildings
 - 7.2.1 New Buildings
 - 7.2.2 Existing Buildings

8 Waste Heat Recovery and Co-Generation

- 8.1 Concept, classification and benefits of waste heat recovery
- 8.2 Concept and types of co-generation system

9 General Energy Saving Tips

Energy saving tips in:

- 9.1 Lighting
- 9.2 Room Air Conditioner
- 9.3 Refrigerator
- 9.4 Water Heater
- 9.5 Computer
- 9.6 Fan, Heater, Blower and Washing Machine
- 9.7 Colour Television
- 9.8 Water Pump
- 9.9 Cooking
- 9.10 Transport

10 Energy Audit

- 10.1 Types and methodology
- 10.2 Energy audit instruments
- 10.3 Energy auditing reporting format

PRACTICAL EXERCISES

1. To conduct load survey and power consumption calculations of small building.
2. To check efficacy of different lamps by measuring power consumption and lumens using lux meter.
3. To measure energy efficiency ratio (EER) of an air conditioner.
4. To measure effect of valve throttling and variable frequency drive (VFD) on energy consumption by centrifugal pump.
5. To measure and calculate energy saving by arresting air leakages in compressor.
6. To measure the effect of blower speed on energy consumed by it.

V SEMESTER

5.1 INTEGRATIVE COMMUNICATION

L	T	P
-	-	4

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time		
		L	T	P
1.	Introduction to Personality Development	-	-	02
2.	Factors Influencing / Shaping Personality	-	-	02
3.	Self Awareness - 1	-	-	03
4.	Self Awareness - 2	-	-	02
5.	Self Awareness - 3	-	-	02
6.	Change Your Mind Set	-	-	02
7.	Interpersonal Relationship and Communication	-	-	03
8.	Non-Verbal communication Communication Skills	-	-	02
9.	Communication Skills ACTIVITIES	-	-	06
10.	Body Language skills	-	-	03
11.	Leadership Traits & Skills	-	-	03
12.	Attitude	-	-	03
13.	Analyzing & Solving a Problem skills	-	-	02
14.	Time Management skills	-	-	03
15.	Stress Management Skills	-	-	02
16.	Interview Skills	-	-	04
17.	Conflict Motives	-	-	02
18.	Negotiation / Influencing Skills	-	-	02
19.	Sociability	-	-	03
20.	Importance of Group	-	-	03
21.	Values / Code of Ethics	-	-	02

PERSONALITY DEVELOPMENT

1 Introduction to Personality Development

AIM, Skills, Types of Skills, LIFE SKILLS VS OTHER SKILLS,
Concept of Life Skills. Ten core Life Skills identified by

WHO

2. Factors Influencing / Shaping Personality :

Introduction, Physical and Social Factors Influencing /
Shaping

Personality (Hereditary, Self-Development, Environment,
Education, Life-situations) Psychological AND Philosophical
Factors Influencing / Shaping Personality (Past Experiences,
Dreams and Ambitions, Self-Image, Values)

3. Self Awareness - 1

DIMENSIONS OF SELF AWARENESS (Self Realization, Self
Knowledge or Self Exploration, Self Confidence, Self Talk,

Self

Motivation, Self Esteem, Self Image, Self Control, Self
Purpose, Individuality and Uniqueness, Personality, Values,
Attitude, Character), SELF REALIZATION AND SELF EXPLORATION
THROUGH SWOT ANALYSIS AND JOHARI WINDOW,

4. Self Awareness - 2

SYMPATHY VS EMPATHY AND ALTRUISM,
Importance of Empathizing with Others,

5. Self Awareness - 3

Self-Awareness through Activity, Body Image (What is Body
Image, What Decides our Body Image, What is Poor Body
Image, What are the Harmful Effects of Poor Body Image),
Tackling Poor Body Image(Enhance Self-Esteem, Build Up
Critical Thinking, Build up Positive Qualities, Understand
Cultural Variation, Dispel Myths, Utilize Life Skills)

6. Change Your Mind Set

What is Mindset, HOW TO CHANGE YOUR MINDSET (Get the
Best Information Only, Make the best people your Role Model,
Examine Your Current Beliefs, Shape Your Mindset with Vision
and Goals, Find Your Voice, Protect Your Mindset, Let Go of
Comparisons, Put An End To Perfectionism, Look At The
Evidence, Redefine What Failure Means, Stop Worrying About
What "People" Think)

INTERPERSONAL SKILLS

7. Interpersonal Relationship and Communication

INTERPERSONAL RELATIONSHIP , Forms of Interpersonal

Relationship, Must Have in an Interpersonal Relationship, Interpersonal Relationship between a Man and a Woman (Passion, Intimacy, Commitment), Relationship Between Friends, ROLE OF COMMUNICATION IN INTERPERSONAL RELATIONSHIP (Take Care Of Your Tone And Pitch, Choice of Words is Important in Relationships, Interact Regularly, Be Polite, Try To Understand The Other Person's Point Of View As Well, Individuals Can Also Communicate Through Emails,

8. NON-VERBAL COMMUNICATION Communication Skills

Non-Verbal Communication, We Communicate with Our Eyes, Communication with Facial Expression, A Good Gesture, Appearance, Posture and Gait, Proximity and Touch), IMPORTANCE OF LISTENING, Characteristics of Good and Effective Listener(Is Attentive,

Do

Not Assume, Listen for Feelings and Facts, Concentrate on the Other Speakers Kindly and Generously, Opportunities)

9. Communication Skills ACTIVITIES -

Activities in Making Collages, Making Advertisements, PPT Preparation & Presentation, Speaking -Seminars, Group Discussions, Debates, Extempore Speeches, Listening to an audio clip and telling

its

gist, Answering a telephone call, Making enquiries, General tips-

Pronunciation, Tone, Pitch, Pace, Volume, relevance, brief, simple Reading Newspaper, Magazines (Current Affairs, Economic magazines, Technical magazines), How to read a report, article, Writing- Resume Writing, Writing joining

report,

Notice writing, Report making, Proposal writing, Advertisement,

Notice for tender, Minutes writing, E-Mail writing, Listening News, Listening to audio clips.(Lecture, poetry, speech, songs),

10. Body Language skills

Introduction, What is Body Language , Body Language Parts, Personal Space Distances (Intimate Distance, Personal Distance,

Social Distance, Public Distance), IMPORTANT BODY LANGUAGE SIGNS AND THEIR MEANING

UNDERSTANDING OTHERS

11. Leadership Traits & Skills :

Introduction, Important Leadership Traits (Alertness, Bearing, Courage, Decisiveness, Dependability, Endurance, Enthusiasm, Initiative, Integrity, Judgment, Justice, Knowledge, Loyalty, Sense

of Humour), Other Useful traits (Truthfulness, Esprit-de-corps, Unselfishness, Humility and sympathy, Tact without loss of moral courage, Patience and a sense of urgency as appropriate, Selfconfidence, Maturity, Mental including emotional stability)

12. Attitude

Types of Attitude, Components of Attitudes (Cognitive Component, Affective Component, Behavioral Component), Types of Attitudes (Positive Attitude, Negative Attitude, Neutral Attitude, Rebellious Attitude, Rational and Irrational Attitudes, Individual and Social Attitudes), Kinds of Attitude, ASSERTIVENESS, How to Develop Assertiveness (Experiment and Try New Things, Extend Your Social Circle, Learn to Make Decisions for Yourself, Indulge in Knowledge, Admire Yourself & Others), Negotiation (Be Sensitive to The Needs Others, Be Willing To Compromise, Develop Your Problem-Solving Skills, Learn to Welcome Conflict, Practice Patience, Increase Your Tolerance For Stress, Improve Your Listening Skills, Learn To Identify Bottom-Line Issues Quickly, Be Assertive, Not Aggressive)

PROBLEM SOLVING

13. Analyzing & Solving a Problem skills

Critical Thinking, Creative Thinking, Decision Making, Goal Setting & Planning, Problem Solving

14. Time Management skills

Need of Time Management, TIME WASTERS (Telephone, Visitors , Paper work, Lack of Planning & Fire Fighting , Socializing , Indecision , TV , Procrastination), PRINCIPLES OF TIME MANAGEMENT - Develop a Personal Sense of Time (Time Log , value of other people's time), Identify Long-Term Goals , Concentrate on High Return Activities , Weekly & Daily Planning (The Mechanics of Weekly Planning , Daily Planning), Make the Best Use of Your Best Time , Organize Office Work (Controlling Interruptions , Organizing Paper Work), Manage Meetings, Delegate Effectively, Make Use of Committed Time, Manage Your Health,

15. Stress Management Skills

INTRODUCTION, Understanding Stress and its Impact, Expected

Responses (Physical, Emotional, Behavioral), stress signals(thoughts, feelings, behaviors and physical), STRESS MANAGEMENT TECHNIQUES (Take Deep Breath, Talk It Out, Take A Break, Create a Quite Place in Your Mind, Pay Attention to Physical Comfort, Move, Take Care of Your Body, Laugh, Mange Your Time, Know Your Limits, Do You Have To Be Right Always, Have A Good Cry, Look for the Good Things Around You, Talk Less, Listen More), UNDERSTANDING EMOTIONS AND FEELINGS-through Activity

16. Interview Skills (2 sessions from Industry Expert is Compulsory)

Curriculum Vitae (When Should a CV be Used, What Information Should a CV Include, personal profile, Covering Letter, What Makes a Good CV, How Long Should a CV Be, Tips on Presentation), Different Types of CV (Chronological, Skills-Based), BEFORE THE INTERVIEW , CONDUCTING YOURSELF DURING THE INTERVIEW , FOLLOWING THROUGH AFTER THE INTERVIEW , Interview Questions To Think About , MOCK INTERVIEW - Activity (MOCK INTERVIEW EVALUATION - NON-VERBAL BEHAVIORS, VERBAL BEHAVIORS, General Etiquettes to face the Board , Telephonic interview

17. Conflict Motives -Resolution

Motives of Conflict(Competition for Limited Resources, The Generation Gap and Personality Clashes, Aggressive Personalities, Culturally Diverse Teams, Competing Work and Family Demands, Gender Based Harassment), Merits and Demerits of Conflict , Levels of Conflict (Interpersonal Conflict, Role Conflict, Inter-group Conflict, Multi-Party Conflict, International Conflict), Methods of Conflict Resolution (The Win-Lose Approach, The Lose-Lose Strategy, The Win-Win Approach), Techniques for Resolving Conflicts (Confrontation and Problem Solving Leading to Win-Win, Disarm the Opposition, Cognitive Restructuring, Appeal to Third Party, The Grievance Procedure)

18. Negotiation / Influencing Skills

Why Influencing, What Is Influencing, TYPES OF INFLUENCING SKILLS (Probing And Listening, Building Rapport, Sign Posting, Pacing, Selling, Assertiveness), LAWS AND PRINCIPLES OF INFLUENCE, The Six Laws of Influence (The Law of Scarcity, The Law of Reciprocity, The Law of Authority, The Law of Liking, The Law of Social Proof, The Law of Commitment and Consistency), Influencing Principles (Making a Start, Buy Yourself

Thinking Time, Dealing With Disagreement, Difficult And Sensitive Situations)

19. Sociability : Etiquettes And Mannerism & Social Skills

Need for Etiquette , Types of Etiquettes (Social Etiquette, Bathroom Etiquette, Corporate Etiquette, Wedding Etiquette, Meeting Etiquette, Telephone Etiquette, Eating Etiquette, Business Etiquette, E-Mail Etiquettes,), MANNERISMS, HOW TO IMPROVE YOUR SOCIAL SKILLS (Be Yourself, Be Responsible, Be Open & Approachable, Be Attentive, Be Polite, Be Aware, Be Cautious)

20. Importance of Group / Cross Cultural Teams / Team Work skills

Introduction, Types and Characteristics of Groups (Definition of a Group, Classification / Types of Groups, Friendship Group, Task Group, Formal Groups, Informal Group, Effective Group), Importance of a Group, Characteristics of a Mature Group, TYPES AND CHARACTERISTICS OF A TEAM (Definition of a Team, Types of Teams, Functional Teams, Problem Solving Teams, Cross - Functional Teams, Self - Managed Teams), Importance of a Team, Characteristics of a Team

21. VALUES / CODE OF ETHICS

Meaning, A FEW IMPORTANT VALUES (Honesty, Integrity, Purity, Discipline, Selflessness, Loyalty, Fairness, Equality, Trust, Support, Respect, etc)

Note : One Orientation module for the faculty is must.
Involvement of Industry Experts is necessary for Interview Skills

5.2 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.
 - 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.

5.3 TECHNOLOGY OF DYEING-II

L T P
4 - 6

Rationale

Dyeing is as old as the manufacture of fabrics. Now it is an important activity in the textile processing house. One can say that dyeing itself is an industry today. Therefore it is imperative to introduce the students of the textile chemistry with the subject.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time
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	L	T	P
1. Azoic Colours	8	-	-
2. Reactive Dyestuffs	8	-	-
3. Pigment Colours	6	-	-
4. Oxidation Colours	8	-	-
5. Mineral Colours	12	-	-
6. After Treatment	4	-	-
7. Concept & Mechanisam of Dyeing	10	-	-
	56	-	84

DETAILED CONTENTS

1. AZOIC COLOURS:

Principle of dyeing and methods of dyeing cotton and silk.

- (a) Naptholation
- (b) Diazotization of bases.
- (c) Alkali binding agents.
- (d) Stabilized diazofast salts.

2. REACTIVE DYESTUFFS:

Chemistry and methods of dyeing cotton, wool and silk. Classification of Reactive dyes, Brief description of Vinyle Sulphone, Bi-functional, HE and ME Reactive Dyes.

3. PIGMENT COLOURS:

Chemistry of Dyeing of cotton with Pigments Colours.

4. OXIDATION COLOURS:

- (i) Aniline black and diphenyl black and their application to cotton.

5. MINERAL COLOURS:

- i. Dyeing of Mineral Khaki on cotton.
- ii. Preparation and dyeing of acetate rayons with disperse and azoic colours.
- iii. Preparation and dyeing of polyester fibre with desperse dyes by various methods, i.e. Conventional carrier high temperature and thermosol method.

Nature and classification of carriers in chemicals. Mechanism involved in carrier dyeing.

6. AFTER TREATMENT :

For fixation of dyes, Soaping and dyeing of hosiery goods.

7. CONCEPT AND MECHANISAM OF DYEING:

Various principles of Dyeing, Theory of Dyeing, Dyeing Mechanism- Adsorption, Diffusion, Dye fibre attachment (Fixation), Equilibrium between dye solution and fibre.

Dyeing System - Different types of bond formation between dyes and fibres.

Mechanism of carrier dyeing method for polyester with its advantages and disadvantages.

Dyeing of Polyester/Cotton with single bath and double bath method.

Concept of glass transition temperature (T_g), T_g of different Synthetic fibre such as polyester, acrylic, nylon, etc.

TECHNOLOGY OF DYEING-II

LIST OF EXPERIMENTS

1. Dyeing of cotton and silk with azoric colours (at least two experiments by different methods) by exhaustion and padding.
2. Dyeing of cotton with cold and hot brand reactive dyes by exhaustion, pad batch and pad dry cure.
3. Dyeing of cotton with pigment dyes.
4. Dyeing of cotton with aniline black.
5. Dyeing of mineral Khaki on cotton.
6. Dyeing of cotton with phthalogen blue.
7. Dyeing of acetate rayon with disperse dyes.
8. Dyeing of polyamide fibres with dispersed acid dyes.
9. Dyeing of polyester with dispersed dyes with and without carrier, high temperature and thermosol method.
10. Dyeing of polyacrylic with basic dyes.
11. Dyeing of blends of cotton-wool, terry-wool, polyester-cotton (solid shade, cross dyeing and reserve dyeing).
12. Demonstration and preparation of line diagrams of prescribed machines in theory.
13. Dyeing of compound shades and shade matching.
14. Colour matching.

5.4 TECHNOLOGY OF TEXTILE PRINTING

L T P
4 - 6

Rationale

Printing of fabrics for making it attractive is an art and there is no end to development of technologies for the process. The paper is meant to give an insight of the means and methods used in printing presses.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Introduction	6	-	-
2.	Composition of Printing Paste	9	-	-
3.	Printing	20	-	-
4.	Ageing and Steaming	9	-	-
5.	Washing and Soaping	6	-	-
6.	Printing of Yarn	6	-	-
		56	-	84

DETAILED CONTENTS

1. Introduction to printing, methods and styles.
2. COMPOSITION OF PRINTING PASTE:
 - 2.1 Classification of thickening agents like preparation of thickening paste.
 - 2.2 Solvents, hygroscopic agents, acids, alkalies, oxidising and reducing agents and binders.
3. PRINTING:
 - i. Direct, discharge and resist styles of printing on cotton using direct, vat, reactive, azoic, solubilised vat, rapid fast.
 - ii. Coloured resist and discharge under the dyes listed in (3).
 - iii. Pigment printing using pigments separately and alongside with other colours.

- iv. Miscellaneous styles of printing such as dyed style, raised style, batik style, tie and dye style, crimp style and flock style.
 - v. Printing of wool, manmade fabrics and blends.
 - vi. Introduction of block printing, its advantages, disadvantages and limitations.
 - vii. Roller printing, various parts of machine, their functions, printing technique, common faults and their rectification.
 - viii. Engraving of copper rollers: hand, machine and pantograph methods, chromium plating.
 - ix. Preparation of screen by Photo Chemical Method
 - xi. Various types of faults and its remedies of printing.
 - xii. Flat bed and rotary screen printing, preparation of rotary screens, different squeegee systems.
 - xiii. Introduction to polychromatic printing and transfer printing.
4. AGEING AND STEAMING:
- Ageing and steaming, various ageing and steaming equipments including high temperature steamers.
5. Washing and soaping, open soaper.
6. PRINTING OF YARN:
- Introduction to printing of yarn.

TECHNOLOGY OF TEXTILE PRINTING

LIST OF EXPERIMENTS

1. Printing of cotton with blocks, screens, stencils. Roller printing machines.
2. Printing of cotton by direct style using direct, vat, reactive, solubilised vat, rapid fast, rapidogen, aniline black, azoic and pigments.
3. Printing of manmade fibre fabrics.
4. Printing of blends.
5. Printing of cotton by discharge style under various classes of dyes.
6. Printing of cotton by resist style under various classes of dyes.
7. Coloured discharge and coloured resist under vat, azoic, aniline black and reactive dyes.

5.5 TEXTILE PROCESSING CHEMICALS AND AUXILIARIES

L T P
6 2 -

Rationale

Textile processing requires use of variety of chemicals having their specific function. The knowledge of these chemicals is imperative for the persons concerned with the processing.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
A.	Auxiliaries	25	8	-
B.	Dyeing & Printing Auxiliaries	25	8	-
C.	Finishing Auxiliaries	25	8	-
D.	Evaluation	9	4	-
		84	28	-

DETAILED CONTENTS

- A. AUXILIARIES
1. Introduction to textile auxiliaries, Meaning of the term and their function.
 2. Classification of textile auxiliaries according to their use.
 3. Surface activity, wetting and detergency.
 4. Biodegradability of surfactant.
 5. Sequestering agents
 6. Function, Properties and Application of auxiliaries in scouring, bleaching, mercerizing.
- B. DYEING & PRINTING AUXILIARIES :
- Functions, Properties and application of various dyeing and printing auxiliaries with examples.
- C. FINISHING AUXILIARIES

Functions, Properties and application of various finishing auxiliaries with examples.

D. EVALUATION :

Evaluation of some important textile auxiliaries such as wetting, Detergency, leveling agents, etc.

5.6 CHEMISTRY OF INTERMIDIATES AND DYES

L T P
6 2 -

Rationale

Dyeing is an important activity in textile industry. So knowledge of dyes and other intermediate chemicals is essential for persons concerned with these activities.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
3.	History of Dyestuff Development	34	12	-
4.	Methods of Preparing Dyes	34	11	-
5.	Chemical Constitution of Dyes	16	5	-
		84	28	-

DETAILED CONTENTS

1. HISTORY OF DYESTUFF DEVELOPMENT:
Historical development of dyestuff industry. Classification of dyes according to their chemical constitution.
2. METHODS OF PREPARING DYES:
General methods of preparing Nitroso, Nitro, Azo, Anthraquinone, vat, solubilised vat with one or two examples of dye preparation (not by name), Preparation of reactive dyes- Procion and Vinyl Sulphone.
3. CHEMICAL CONSTITUTION OF DYES:

Basic terms of colour chemistry Theory of colour,
Relation
Between chemical constitution of dyes. Concept of light and
pigment
theory. Chemistry of metal complex dye, Chemistry of after
treatment
of direct dye.

VI Semester

6.1 ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

L	T	P
4	-	-

RATIONALE:

A diploma 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. irrigation, 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 Biodegradability, composting, bio remediation, Microbes .Use of biopesticides 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 quality 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, CO, 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 quality 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.
- 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 benefit 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.

6.2 TECHNOLOGY OF FINISHING

L	T	P
6	2	-

Rationale

Importance of finishing activities to textile products can not be over looked. The technology involved in the activity is matter of great interest and value to the persons concerned.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Introduction	6	2	-
2.	Finishing Activities, Ingradients & Equipments	40	15	-
3.	Weighing of Silk	8	3	-
4.	Finishing of Woolen Fibrics	15	4	-
5.	Finishing of Synthetic Fibre Fabrics	15	4	-
		84	28	-

DETAILED CONTENTS

1. Introduction and classification of textile finishing.
2. FINISHING ACTIVITIES, INGRADIENTS & EQUIPMENTS:
 - i. Starch preparation tanks, starching mangles, back filling machines and their working.
 - ii. Principles and working of drying cylinders, stenters (clip and pin) hot flue and float drier.
 - iii. Purpose of damping and damping machine.
 - iv. Function of calendering, different types of calenders as plain, chasing, friction, schriener, emboss and felt.
 - v. Purpose of raising and working of raising machine.
 - vi. Principle and working of Sanforizing/Zero-Zero finishing
 - vii. Rot and mildew proofing agents and their application.
 - viii. Wash and Wear Finishes - Crease resisting agents as Urea formaldehyde, Malamine formaldehyde, Di-methylol Ethylene

Urea (DMEU), Di-methylol, Di-hydroxy ethylene urea (DMDHEU), Propylene Urea, Carbamates etc, their application to cellulosic materials, catalysts and other additives used in anticrease finishing..

ix. Water Proof/Water Repellent Finishes -Application of Aluminium Soaps, Wax emulsions, Reactive softeners and Silicone emulsions, their applications for water-proof and water-repellent finish.

x. Flame Retardent Finishes -Application of borax, boric acid, phosphoric acid urea, THPC (Tetra Kis Hydroxy Phosphonium Chloride), APO (Aziridinyl Phosphonium Oxide) to cellulosic materials for flame-proofing.

3. WEIGHING OF SILK:

Weighing of silk, Finishing of woolen fabrics.

4. FINISHING OF WOOLEN FABRICS:

Decatising, Permanent Setting, Felting of Wool, London shrinking and Sponging, Principle and working of rotary and Paper Press Machine.

5. FINISHING OF SYNTHETIC FIBRE FABRICS:

- Heat setting mechanism of heat setting,
- Antistatic finish, Agents used and their application.
- Soil release, Finish-agents used and their application.
- Pilling : Mechanism and methods for preventing pilling.

6.3 ADVANCE WET PROCESSING & PROCESS CONTROL IN PROCESSING

L T P
6 2 -

Rationale

The paper deals with the new developments in the textile processing such as dyeing and printing. This knowledge is important for working in modern plants.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Process Control	34	10	-
2.	Recent Development	60	18	-
		84	28	-

DETAILED CONTENTS

1. PROCESS CONTROL :
 - A. Define quality, quality control and process control with its role, Scope and importance.
 - B. Importance of total Quality Control (TQC) and Total Quality Management (TQM) system.
 - C. Process Control in Preparatory Process
 - D. Process Control in dyeing, printing and finishing.
 - E. Faults found during inspection of desized, scoured, bleached, dyed, printed and finished fabrics their causes and remedial measures.
 - F. Computerised colour matching
 - G. Organizations for Standard Quality Certification ISO 9001 (Quality Product), ISO 14001 (Environment), etc. Brief study of Six Sigma Concept.
 - H. Computer Application in Textile Wet Processing Industry.
2. RECENT DEVELOPMENT :

Development in Eco-friendly dyes to satisfy the eco-parameters. Role of dyestuff manufacturing companies to reduce impact on environment. Brief study of Toxic intermediates and banned azo dyes. Brief description of Continuous Bleaching Range, Continuous Dyeing Range, Solvent dyeing techniques, Differential dyeing techniques, Soft flow

dyeing machine for woven and knitted fabrics. Right First Time (RFT) concept in dyeing, Kuster Roll Mangle Technology used in modern dyeing machine. Energy conservation in wet processing. Digital Printing

6.4 INTRODUCTION TO KNITTING AND GARMENT TECHNOLOGY
(COMMON TO TEXTILE TECHNOLOGY)

L T P
4 2 6

Rationale

This paper deals with new developments in knitting and garment technology. This knowledge is the need of the hour to pace with the time.

Topic Wise Distribution of Periods

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Knitting	6	3	-
2.	Loop formation with needle	6	3	-
3.	Knitting Needles	6	3	-
4.	Stiches	4	2	-
5.	Types of loops	4	2	-
6.	Garment Classification	4	2	-
7.	Patterning and grading	4	2	-
8.	Types of Sleeves	6	3	-
9.	Spreading, Cutting and Sorting	6	3	-
10.	Sewing Technology	6	3	-
11.	Stiching defects & their remedies	4	2	-
		56	28	84

DETAILED CONTENTS

1. KNITTING :

Introduction and general terms of knitting, Difference in woven and knitted fabrics, properties-knit Vs woven. Warp and weft knitting-mechanism and comparison.

2. LOOP FORMATION WITH NEEDLE :

Running position, clearing position, Feeding position, Knocking over positions, Knitting position.

3. KNITTING NEEDLES :

Beard, Latch, Compound type of knitting needles, Advantages and disadvantages of beard and latch type.

4. STITCHES :

Knit, tuck and floats and its comparison.

5. TYPES OF LOOPS :

Types of loops, Classification of weft knitted fabrics - single knit (single jersey), Double knit (double jersey), Factors responsible for production is weft knitting machine.

6. GARMENT CLASSIFICATION :

Garment classification for men and woven. Fibre selection for garment and properties. Measurement and its importance, Methods of taking important body measurements for gents and ladies garments.

7. PATTERNING AND GRADING :

Patterening, importance of paper patterns, Types of patterns, Study of pattern drafting, Identification of fitting problems and its remedy.

8. Types of sleeves, collars, pockets, etc.

9. SPREADING, CUTTING AND SORTING :

Objectives of spreading, Methods of spreading, cutting and sorting.

10. SEWING TECHNOLOGY :

Classification of stitch, Types of seams sewing tools and part of sewing machine.

11. Stitching defects & their remedies.

LIST OF PRACTICALS

1. Standard measurement for children.
2. Bodies block for
 - i. 3 Years child
 - ii. Grown up woman
 - iii. Grown up man
3. Application of the principle and technique of pattern making for design and construction of -
 - i. Blouse
 - ii. Ladies suit
 - iii. Gents shirts
 - iv. Pant.
4. Drafting of different types of sleeves and collars.
5. Study of construction and working of knitting machine..pa

6.5 PROJECT

Two periods per week are allotted for project work in the final year of the course. In classroom students (i) be encouraged and helped for developing new designs in prints (ii) be given clear idea of establishing a processing unit of given size beginning from selection of site, deciding type of building construction/shed. Units of machinery required, their layout. Fundamental requirements of processing house. Deciding number of workers and their type. Process control in different section of the process house . Elements of costing and costing procedures in various sections. Factors affecting productivity and efficiency of men and machines, sources of finance and development of resources.

For general awareness students be introduced to organisations involved in certification, standardisation, research and development of textile products Viz. BIS, Centre Silk Board, Textile Committee, Textile Commission, Jute Commission, ATIRA, NITRA, BTRA, etc.

The project paper will be of two parts. Part-A will contain the problems to evaluate students learning. The Part-B will be regarding students awareness of the plans and programmes running for rural development, ecological balance and environmental pollution control, entrepreneurship development and agencies involved in these works.

PART-A:

Part-A will contain two types of problems (i) relating to development of designs in prints and preparing their samples. (ii) relating to establishment of a processing unit (Dyeing or Printing) of given size. The student will be allowed to choose one either kind of the problem to solve.

PART-B:

The student Will survey a village and prepare a report giving details of population, Means of lively hood, Health and hygenic conditions, Education facilities and various programmes/projects running for the development and the personnels and agencies involved in the work. He will also make observation on environmental pollution and ecological disturbunces and will make a mention of that in his report with its reason, suggesting remedies or ways to minimise it. Without it the project will not be taken as complete. The student will also do some constructive work for pollution control as advised by the guiding teacher

Student will choose any one of the problems from Part(A) and Part(B) is compulsory for all students. The students can be divided into groups of threes to do one problem. The students will be examined for 100 marks by an examiner appointed by B.T.E, U.P.

1. Examination Marks 100

Part A:-

Project Work	50
Viva Voce	25

Part B:-

Project Work	15
Viva Voce	10

Sessional Marks	50	50
	-----	-----
Total	150	150
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6.6 INDUSTRIAL TRAINING

Industrial Training - For Four Week

Viva Voce	80
Sessional Marks	40

Total	120

DIPLOMA IN TEXTILE CHEMISTRY STAFF STRUCTURE

Intake of the Course		60
Pattern of the Course		Semester Pattern
S.No.	Name of Post	No.
1.	Principal	1
2.	HOD	1
3.	Lecturer(*)	7
4.	Lecturer in Communication Tech.	1
5.	Instructor	2
6.	Computer Programmer	1
7.	Steno Typist	1
8.	Accountant/Cashier	1
9.	Student/Library Clerk	1
10.	Store Keeper	1
11.	Class IV	6
12.	Sweeper	As per need
13.	Chaukidar & Mali	As per need

NOTE :

1. The number of staff required for individual institution shall be worked out in accordance with the norms laid down in G.O.No. 2281/Pra. Shi. -3-1989-60 (B)/85 dated June 27, 1989.
2. Services of the staff of other disciplines of the Institute may be utilised.
3. The post of "Computer Programmer" is not needed in the institutions where diploma in "Electronics Engineering" is running.

4. QUALIFICATIONS OF STAFF : As per Service Rules.

*: Lecturer - Four - Degree In Textile Technology

Lecturer - Two - Degree In Textile Chemistry

Lecturer - One - B.F.A. (Textile Designing)

SPACE STRUCTURE

No. M2

[A]. Administrative Block

1.	Prinicipal's room	1	30
2.	Steno room	1	6
3.	Confidential room	1	10
4.	Reception Lounge	1	25
5.	Main Office	1	(.25 Sqm./Student)
6.	Library (common with other disciplines)	1	150
7.	Common room	3	150
	A. Boys Common Room	1	50
	B. Girls Common Room	1	50
	C. Staff Common Room	1	50
8.	Class rooms	2	120
9.	Store (100+0.1xStudent Population)	1	109
10.	Confrence Room	1	75
11.	Head of Department Room	1	15
12.	Lecturer Room		(10 Sqm./Lecturer)
13.	Confidential Office for Examination work	1	25
14.	Estate Office (Security,Campus,Services)	1	25

[B] Acedemic Block

Sl.No.	Detail of Space	No.	@ Sq.m	Floor Area Sq.m.
1.	Class Room	2	60	120
2.	Drawing Hall	1	120	120
3.	Physics Lab			90
4.	Chemistry Lab			120
5.	General Mechanical Engineering Lab			60
6.	Textile Testing Lab.			
	A Fibre			11470x4800mm
	B Yarn			11470x4800mm
	C Fabric			11000x7500mm
7.	Process House (Dyeing, Bleaching and Printing & Finishing)			39830x15230mm
8.	Electrical Technology & Electronics Lab or Common with Electrical Engineering.			120
9.	Computer Lab (Air Cond.Glass Partition and Special type pvc flooring and false ceiling)			60
10.	Advance Welding Lab/Shop			90

[C] Work shop

I	Workshop Supdt. Room	12
II	Store	20
III	Shops	
(a)	Carpentry Shop	50
(b)	Smithy Shop	70
(c)	Fitting Shop	50
(d)	Welding Shop	50
(e)	Painting Shop	50
(f)	Sheet Metal ,Soldering & Brazing shop	50
(g)	Plumbing shop	50

[D]. Common Facilities			
1.	Dispensary	1	75
2.	Canteen, Cooperative Store, Bank Extension Centre, Postal Services etc.	1	150
3.	Parking space		
	A. Cycle Stand	(1 Sqm./Cycle For 25% Students)	
	B. Scooter Stand	(3 Sqm./Scooter For 25% Students)	
	C. Car Garage	(15 Sqm./ Car)	
	D. Bus Garage	(55 Sqm./ Bus)	
4.	N.C.C. block	1	(2 Sqm/Student)
5.	Guest room (with 2 guest rooms and service facility)	1	100

[E.] Residential Facilities			
1.	Hostel for students	1	for 50% boys & 100% girls students to be provided in seperate block)
2.	Staff quarters		
	Principal	1	Type IV
	HOD/Warden		Type IV
	Sr. Lect./Lect.		Type IV
	Technical/Ministerial staff		Type II
	Class IV		Type I
3.	Play ground (common)	1	1500-2500 Sqm depending upon availability of land

Priority to be given in following order

- (1)
 - a. Administrative Building
 - b. Labs
 - c. Workshop
 - d. Over head Tank
 - e. Boundary Wall
 - f. Principal Residence
 - g. Fourth Class Quarters (2/3)

- (2)
 - a. Hostel
 - b. Students Aminities

- (3)
 - Residences of employee

LIST OF EQUIPMENT

1. Equipment essentially required for performing the practicals mentioned in the curriculum are only to be procured.
2. Experimental model/Prototype/Lab Model be purchased in place of costly machines/equipments.
3. "Machine/Equipment/Instruments of old BTE list which are not included in the list given below are to be retained in the Lab/Shop for Demonstration purpose but not to be purchased fresh."

I. APPLIED PHYSICS LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Brass ball with hook 2 cm. dia	2	20	40
2.	Stop clock least count 0.1 Sec	2	500	1000
3.	Wall bracket with clamping arrangement	2	50	100
4.	Meter scale	5	20	100
5.	Convex lenses of focal length 10 cm., 20 cm., 50 cm. and 100 cm. 2 nos. of each	8	10	80
6.	Optical bench steel with pin and lens holders	2	500	1000
7.	Astronomical telescope	1	500	500
8.	Searl's conductivity apparatus with copper & steel rods 25 X 4 cm. diameter with all accessories	1 set	1000	1000
9.	Lea's conductivity app. complete with all accessories	1 set	1000	1000
10.	Constant water flow arrangement	2	400	800
11.	Boiler made of copper 2 lt. cap.	4	200	800
12.	Platinum resistance thermometer	2	800	1600
13.	Potentiometer - 10 wires with jockey	1	500	500
14.	Meter bridge complete	1	250	250
15.	Lead accumulator 2.2 V. and 20 amp. hour capacity	2	250	500
16.	Moving coil galvanometer	3	200	600
17.	Moving coil ammeter 0-1 amp., 0-5 amp., 0-10 amp., 1 no of each	3	250	750
18.	Moving coil voltmeter 0-1 V. 0-5 V., 0-10 V. 1 No of each	3	250	750
19.	Leclanchi cell complete	3	100	300
20.	Resonance col. of steel tube with tuning forks and other accessories	1	500	500
21.	Tuning forks set of different frequencies	1 set	1000	1000
22.	App. for determining coefficient of friction on a horizontal plane	1 set	1000	1000
23.	Appratus for determining characteristics of P-N junction diode complete with all accessories	1 set	1500	1500
24.	Post office box dial type	1	1200	1200
25.	Resistance box 0-10 ohm., 0-100 ohm. 2 nos. each	4	400	1600

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
26.	Rheostat of different ohm.capacity	8	250	2000
27.	Physical balance with weight box	2	800	1600
28.	Set of fractional weights	10	20	200
29.	Fortin's barometer with mercury	1	2500	2500
30.	Battery eleminator 6 V. & 3 amp.	1	250	250
31.	Lab tables	3	8000	24000
32.	Lab stools	10	100	1000
33.	Anemometer cup type	1	1000	1000
34.	Anemometer hand held	1	1000	1000
35.	Suryamapi	1	1500	1500
36.	Insolation meter	1	1500	1500
	Misc.	LS		5000

II. APPLIED CHEMISTRY LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Test tube stand	15	10	150
2.	Funnel stand	15	10	150
3.	Burette stand	15	30	450
4.	Pipette stand	15	10	150
5.	Chemical balances with analytical weights 1gm -200gms	5	1500	7500
6.	Fractional weights set with rider	5sets	25	125
7.	Kipp's apparatus 1000 ml. polythen	2	500	1000
8.	Reagents bottles			
	250ml	120	10	1200
	500ml	5	15	75
	1000ml	5	25	125
9.	Wide mouth bottle 250 ml	15	15	225
10.	Winchester bottle 2.5 litre	15	30	450
11.	Test tubes 1/4" x 6"	75	1	75
12.	Boiling tube 1" x 6" hard glass	24	10	240
13.	Pestle and mortar 10 cms	2	30	60
14.	Watch glass 7.5 cms	15	5	75
15.	Beakers			
	100 ml.	10	15	150
	250 ml.	24	20	480
	400 ml.	12	25	300
	1000 ml.	5	30	150
16.	Weighing bottle 10 ml with lid	15	10	150
17.	Wash bottles	15	15	225
18.	Conical flask 250 ml.	15	30	450
19.	Flat bottom flask 500 ml.	6	40	240
20.	Flat bottom flask 250 ml.	15	25	375
21.	Burette 50 ml.	15	60	900
22.	Pipette 25 ml.	15	20	300
23.	Measuring flask 250 ml. with stopper	15	50	750
24.	Measring cylinder of various sizes (250 ml, 500 ml, 1000 ml) 3 no. of each	9	LS	250
25.	Bunsen's burner of brass	15	50	750
26.	Gas plant petrol 10 to 20 burners automatic	1	5000	5000
27.	Spirit lamp	15	30	450
28.	Tripod stand	15	10	150
29.	Wire gauge 15 X 15 cm. with asbestos	15	15	225
30.	Test tube holder	15	10	150
31.	Porcelain plates	15	20	300
32.	Funnel 15 cm.	15	16	240
33.	Blow pipe & work tools with electric blower for glass blowing	1 set	10000	10000
34.	Cork borers with sharpn	2 set	100	200
35.	Cork pressure	1 set	250	250
36.	Glass cutting knife	1	75	75
37.	Spatula hard & nickel/steel	2 each	50	100
38.	Water tapes with gooseneek	6	200	1200
39.	Gas taps two way	10	150	1500

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
40.	Pinch cock & screw	15	20	300
41.	Distilled water units (electrical)	1	5000	5000
42.	Distilled water units (solar)	1	5000	5000
43.	Open balance 1000 gms./10 mg.	1	600	600
44.	Platinum wire	5	25	125
45.	Brush for cleaning various type	40	10	400
46.	Jars 20 Lit. for keeping distilled water	5	100	500
47.	Lab table 2 m. x 1.2 m. x 1 m. height 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
48.	Exhaust fans 18"	4	2000	8000
49.	Side racks and selves for bench reagents made of teak wood for 24 bottles each set	4	2000	8000
50.	Digital balance electronic	1	10000	10000
51.	Hot plates 7-1/2", 3" dia controled 2000 watts	1	1000	1000
52.	Hot air oven thermostatically controled with selves and rotary switches 350 x 350 x 25 high	1	8000	8000
53.	pH Meter	1	1000	1000
54.	Glass Electrode	2		
55.	Reference Electro	2		
	Miscellaneous	LS		10000

III. WORKSHOP PRACTICE

CARPENTRY SHOP

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	60 cm.rule	10	15	150
2.	Flexible steel rule 2 metre	2	20	40
3.	T square 23 cm. steel	10	20	200
4.	Bevel square 23 cm. steel	2	30	60
5.	Marking knife 25 cm. steel	10	30	300
6.	Marking gauge wooden & brass 25 cm.	10	30	300
7.	Mortise gauge wooden & brass 25 cm.	10	50	500
8.	Caliper inside, steel 20 cm.	2	50	100
9.	Caliper outside , steel 20 cm.	2	50	100
10.	Compass steel 20cm.	2	40	80
11.	Devicer steel 20 cm.	2	40	80
12.	Plumb	2	20	40
13.	Wooden bench vice steel 20 cm.	10	200	2000
14.	Bench hold fast steel 30 cm.	10	40	400
15.	Bar clamp 2 m.	2	300	600
16.	G clamp of flat spring steel 20x30 cm.	4	60	240
17.	Rip saw 40-45 cm.	10	80	800
18.	Cross cut saw 40-45 cm.	2	80	160
19.	Tennon saw 30-35 cm.	10	50	500
20.	Dovetail saw 30-35 cm.	2	60	120
21.	Compass saw 35 cm.	4	60	240
22.	Key hole saw or pad saw 30-35 cm.	2	25	50
23.	Bow saw	2	25	50
24.	Frame saw	2	25	50
25.	Chisel fish brand 1" to 1/8"			
	firmer	3 set	100	300
	Dovetail	3 set	100	300
	Mortise	3 set	100	300
26.	Gauge or Golchi 1" to 1/8"	3 set	150	450
27.	Wooden jack plane complete	10	100	1000
28.	Wooden smoothing plane	10	80	800
29.	Iron jack plane complete	10	200	2000
30.	Iron rebate plane complete	3	80	240
31.	Iron grooving plane complete	3	120	360
32.	Iron compass plane complete	3	200	600
33.	Wooden moulding plane complete	3	200	600
34.	Bradawl	3	150	450
35.	Gimlet drills set	1 set	150	150
36.	Center bit	2	120	240
37.	Twist bit	2	80	160
38.	Auger bit	2	40	80
39.	Dovetail bit	2	15	30
40.	Counter shank bit	2	20	40
41.	Ratchet brace machine	2	175	350
42.	Grand drill machine 1/4" burmi	2	200	400
43.	Wooden hand drill	5	200	1000
44.	Wooden mallet	10	25	250
45.	Claw hammer	3	30	90
46.	Carpenters hammer	10	30	300
47.	Turning tool set for lathe	3 set	800	2400
48.	Screw driver 18" & 15"	6	50	300

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
49.	Adze 500 gm.	10	50	500
50.	Pincer 175 mm.	6	75	750
51.	Plier 150 mm.	4	90	360
52.	Oil stone 8"	4	75	300
53.	Rasp file 12"	4	100	400
54.	Half round file 12"	4	80	320
55.	Round file 12"	4	80	320
56.	Triangular file 5", 4"	8	60	480
57.	Water stone	4	20	80
58.	Carpentry work benches	4	2000	8000
59.	Band saw machine complete	1	30000	30000
60.	Circular saw machine	1	15000	15000
61.	Grinding machine with motor	1	6000	6000
62.	Universal wood working machine	1	15000	15000
	misc. for foundation of machines	LS		10000
SMITHY SHOP				
1.	Anvil 150 Kg. with stand	5	2500	12500
2.	Swage block 50x30x8cm.&45x45x10cm.	2	1250	2500
3.	Hammers			
	Ball peen 8 Kg.	10	150	1500
	Cross peen 8 Kg.	10	150	1500
4.	Beak iron 25 Kg.	1	500	500
5.	Swages different types	6	40	240
6.	Fullers different types	6	30	180
7.	Leg vice 15 cms. opening	1	150	150
8.	Electric blower with motor	1	5000	5000
9.	Furnace chimney with exhaust pipe	5	5000	25000
10.	Sledge Hammer 5Kg	2	200	400
	Misc. tools		LS	2500
SHEET METAL, SOLDERING & BRAZING				
1.	Dividers - 15cm.	5	60	300
2.	Trammel 1 m.	1		
3.	Angle protector	5	60	300
4.	Try square 30 cm.	5	40	200
5.	Centre punch	5	20	100
6.	Steel rule 30 cm. , 60 cm.,	5	25	125
7.	Sheet metal gauge	1	120	120
8.	Straight snips 30 cm.	2	250	500
9.	Curved snips 30 cm.	2	300	600
10.	Bench shear cutter 40 cm.	1	5000	5000
11.	Chisel 10 cm.	5	100	500
12.	Hammer	5	150	750
13.	Bench vice 13 cm.	5	1000	5000
14.	Plier	5	50	250
15.	Nose plier	5	60	300
16.	Sheet metal anvil/stakes	5	2000	10000
17.	Shearing machine 120 cm.	1	2500	2500
18.	Solder electric	2	500	1000
19.	Solder furnace type	2	250	500
20.	Brazing equipments and accessories	1	5000	5000
21.	Blow lamp	2	250	500
22.	Sheet bending machine	1	10000	10000

Misc.

LS

5000

FITTING SHOP

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Bench vice jaw 10 cm.	10	300	3600
2.	Surface plate 45x45 cm.	2	2000	4000
3.	V. Block 10x7x4 cm.	5	350	1650
4.	Try square	10	40	400
5.	Bevel protractor 30 cm.	1	2100	2100
6.	Combination set	1	2500	2500
7.	Divider	5	60	300
8.	Centre punch	5	20	100
9.	Calipers (Different sizes)	12	20	240
10.	Vernier calipers 30 cm.	2	600	1200
11.	Micrometer 0-25, 25-50 m.m.	4	500	2000
12.	Vernier depth gauge	1	350	350
13.	Feeler gauge--15 blades	1	30	30
14.	Radius gauge	1	100	100
15.	Angle gauge	1	100	100
16.	Thread gauge	1	100	100
17.	Bench drilling machine 13 mm.	1	5000	5000
18.	Double ended electric grinder	1	4000	4000
19.	Drill set	1set	1000	1000
20.	Reamer set	1set	2000	2000
21.	Tap set	1set	2000	2000
22.	Adjustable wrenches	1set	2000	2000
23.	Allen key set	1set	350	350
24.	Spanners	6	60	360
25.	Work benches	6	2000	12000
26.	Power hacksaw	1	4000	4000
	Misc. Files, Dieset, Hexa frames etc.		LS	10000

WELDING SHOP

1.	Ellectric welding set oil cooled	1	10000	10000
2.	Industrial regulator type oil cooled arc welder	1	12000	12000
3.	Air cooled spot welder 7.5 KVA	1	15000	15000
4.	General accssories for air cooled spot welder of 7.5 KVA			8000
5.	Gas welding set with gas cutting torch and complete with all accessories	1	15000	15000
6.	Misc. work benches		LS	20000

PAINTING & POLISHING SHOP

1.	Air compressor complete with 2 HP motor	1set	12000	12000
2.	Spray gun with hose pipe	1	1000	1000
3.	Stoving oven	1	3000	3000
4.	Buffing machine with leather and cotton wheels	1	4000	4000
5.	Electroplating Equipment for cromium	1	10000	10000

Nikle plating.
Misc. LS 2000

PLUMBING SHOP

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Pipe vice 5 cm.	4	250	1000
2.	Chain wrenches	5	250	1250
3.	Ring spanner Set	5	125	625
4.	Wheel pipe cutter	2	300	600
5.	Water pump plier	4	50	200
6.	Pipe die set 2" set	2 set	600	1200
7.	Pipe bending device	1	5000	5000
8.	Work benches	4	4000	16000
9.	Set of various types of plumbing fittings e.g. Bib cock, Cistern, Stop cock, Wheel volve, Gat volve etc.		LS	2000
10.	Misc. Hacksaw frame and others		LS	2000

FOUNDRY SHOP

1.	Moulding boxes	50		12000
2.	Laddles	5		1000
3.	Tool kits	10 sets		2500
4.	Quenching tanks water or oil	2		1000
5.	Permiability tester	1		1000
6.	Mould hardness tester	1		6000
7.	Sand tensile testing equipment	1		7500
8.	Portable grinders	1		3000
9.	Temperature recorders/controllers	LS		5000
10.	Pit furnace with Blower	1		5000

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.	2	25000	50000
2.	Shaper machine 12 inch stroke with 2 H.P. motor 440 volts push button starter with vice 6 inch (Swivel base)	1	20000	200000

NOTE:-

The institutes running mechanical engg. course need not

purchase these two items sepreately because they will have
one complete machine shop for the course

GENERAL MECHANICAL ENGINEERING LAB

(Common to elements of Mechanical Engineering Lab In Mechanical Engineering)

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Biogas Plant	1	By Out door visit	
2.	Windmill	1	By Out door visit	
3.	Experimental Solar Cooker Box Type- Instrumented To Measure Temperature its Performance & Temperature At Various Location.	1	500	500
4.	Photo Voltage Solar Cell	1	10000	10000
5.	Throttling & Separating Colorimeter. (Thermal Engg. Lab)	1	10000	10000
6.	Jib Head Key, Flat Key, Saddle Key, Wood Ruff Key, Feather Key Pinkey & A piece of splined shaft.	1 Set	L.S.	500
7.	Pins- Split Pin, Taper Cottor Type Split Pin, Cottor or Cottor Pin, Cottor Bolts; Lewis or Rag Foundation Bolt, Fish Tail & Square Head Foundation Bolts.	1 Set	L.S.	500
8.	Friction Clutches & Couplings -Cone Clutch, Single Plate Muff Coupling, Flange Coupling Universal Coupling or Hooks Joint. Flexible Coupling- Belt & Pin Type, Coil Spring Type.	1 Set	L.S.	2500
9.	Bearings- Plane, Bushed, Split Step, Ball, Rollar Bearings, Thrust Bearings.	1 Set	L.S.	1000
10.	Spur gear Single & Double Helical Gears, Bevel Gears.	1 Set	L.S.	1000
11.	Simple Spur Gear train	1	1500	1500
12.	Compound Gear Train	1	1500	1500
13.	Epicyclic Gear Train	1	2000	2000
14.	Compression & Tension Helical Springs.	1 Each	200	200
15.	Four Bar Mechanism Fitted on a board.	1	1000	1000
16.	Slider Crank Mechanism	1	1000	1000
17.	Whitworth Quick Return Mechanism Fitted on a board.	1	1000	1000

ELECTRICAL TECHNOLOGY & ELECTRONICS LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	D.C. Shunt Motor 3 Kw. 1500 RPM with 3 Point Starter.	2	10000	20000
2.	D.C. Compound Motor 3 Kw. 1500 RPM	2	10000	20000
3.	Single Phase Transformer 1 KVA 50 Hz. Primary Voltage 230 with tapping at 50%, 86.6 % Facility	2	6000	12000
4.	3 Phase Induction Motor 415 V., 50 Hz, 440 RPM, 3 KVA Star/Delta/Autotransformer Starter.	2	5000	10000
5.	Loading Drum Spring Balance & Belt Arrangement.	2 Set	1000	2000
6.	Tachometer (Analog/Digital)	1	2000	2000
7.	3 Phase Inductive Loading of Variable Nature	1	8000	8000
8.	Single Phase Inductive Loading Variable 0-10 Amp., 50 Hz.	1	8000	8000
9.	Moving Coil Ammeter 0-10 Amp.	8	1000	1000
10.	Moving Coil Voltmeter 0-300 V.	8	1000	8000
11.	Moving Iron Ammeter 0-10 Amp.	8	1000	8000
12.	Moving Iron Voltmeter 0-300 V.	8	1000	8000
13.	Wattmeter Single Phase Dynamo Type 75/300/600 V. 2.5/5 Amp.	4	2500	10000
14.	Three Phase Variable Inductive Loading.	1	8000	8000
15.	Single Phase Variable Inductive Loading with Rheostat.	1	8000	8000
16.	Megger 0-20 Mega Ohm, 500 RPM .			
17.	Flouroscent Tube With Choke.	1	100	100
18.	SCR Bread Board	1	1000	1000
19.	Power Supply 230 V.	1	1000	1000
20.	Moving Coil Ammeter 0-500 M.A.	1	1000	1000

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
21.	Moving Coil Voltmeter 0-250 V.	1	1000	1000
22.	Energy Meter Single Phase 230 V., 5 Amp	1	2000	2000
	Misc.		LS	1500

TEXTILE TESTING LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Baer Sorter (For Fibre Length) Acrylic Transparent Sheet - 6"X8"X2 pices, 3"X8"X2 pcs Fibre Mounting Templest 6"X8"X2 pices, 3"X8"X2 pcs with tweezers, velvet pad, scales, planchass with all complete accessories or Latest Configuration	2	20000	40000
2.	Microscope Digital Mocoscope - Microscope & Ends Counting Equipments- Magnifying Power 5X,10X,20X, 40X,100X lenses Trinocular biological microscope with fibre cross section kit, high resolution CCD camera and imaging software with measurement facilities, Scope of use section of fibre or yarn, analysis of any fibre, yarn and fibre Range : 5X,10X,20X,450X,100X / as per requirements, Focus : Adjustable, Lights - White, Blue, Yellow, Uppper & Lower, Supply - 220 V AC supply Single Phase, with all complete accessories Or Latest Configuration	2	65000	130000
3.	Moisture Meter	1	16000	16000
4.	Wrapreel	2	30000	60000
5.	Wrap Block	2	6000	12000
6.	Beesley Balance	4	7000	28000
7.	Quadrant Balance	2	4000	8000
8.	Lea Strength Tester	1	50000	50000
9.	Single Thread Tester (Digital)	1	100000	100000
10.	R. B. Twist Tester	2	25000	50000
11.	One Inch Twist Tester	2	8000	16000
12.	Take Up Twist Tester Yarn test length : 25 mm to 500 mm adjustable (Metric unit) Or 1" to 20" Maximum adjustable (imperial unit), The test length is automatically taken into account for calculation and final reading is displayed directly in TPM/TPL Range :Upto 60TPL Resolution :1 TPM or 0.01 TPI Motor Speed: Upto 1500 RPM Clamps : Spring loaded clamps at motor end for easy clamping of Yarn	2	28500	57000

Averaging : Reading of at least 10 samples can be stored and average TPM/TPI value is calculated and digital display with pre set device.

Supply : 220 V AC, single phase Suitable for S/Z type of twisted yarn with reset device. Tension weight upto 100 gm adjustable. Yarn spool mounting arrangement at one end of the twist tester with all complete accessories or Latest Configuration

13.	Fabric Strength Tester (Tensile Strength)	1	50000	50000
14.	Tearing Strength Tester	1	20000	20000
15.	Bursting Strength Tester	1	35000	35000
16.	Abrasion Resistance Tester (Martindale Type)	1	50000	50000
17.	Laundrometer (For washing fastness testing)	1	50000	50000
18.	Crocko Meter	1	10000	10000
19.	Digital Fibrograph Measuring Principle-Optical Measuring Range-12.0 to 45.0 mm Measuring Accuracy - +/- 0.1 mm Result Output-2.5% SL,50% SL & UR % Front End Language-English Applicable Standard-ASTM D5332,ISO2648 & IS233 Power Supply-Single Phase 220V AC	1	320000	320000
20.	Uster Evenness Tester	1	2000000	2000000
21.	Trash Analyser	1	150000	150000
22.	Conditioning Oven 220 V With capability of maintaining temperature up to 100oC and facility for smoth variation of temperature inside 27 liter.	1	98500	98500
23.	Stelometer (For bundle Strength)	2	70000	140000
24.	Crease Recovery Tester Size of the Test Specimen - 40mm X 15mm, Crease Load : 1Kg. (Stainless Steel), Angle measurement : On an Engraved circular scale graduated in 1 deg., Scale measurement : 0-180 with all complete accessories Or Latest Configuration	2	15000	30000
25.	Water Repellancy Tester	1	80000	80000
26.	Pilling Tester	1	30000	30000
27.	Crimp Rigidity Tester Minor Load - 2 Gr. to 10Gr. in a step of one grams Major Load - 100 Gr. to 500 Gr. in step of 50 Grams Digital display 220 V, with all complete accessories or Latest Configuration	1	20000	20000
28.	Air Permeability Tester	1	35000	35000
29.	Sheffield Micronair (For Fibre Fineness)	1		

30.	Uster Stapler for fibre length	1		
31.	A.N. stapling apparatus for fibre fineness Tester	1		
32.	Miscellaneous Items-Thermometers, L.S. Heating Devices, Thermohydrograph, Whirling Hydrometer, Dry & Wet bulb thermometer, Physical Balance, etc.			
33.	Classimate (Yarn faults finding equipments)	1		900000
33.	H.V.I. (High Volume Instrument) for various parameter of fibre	1		3500000
34.	Sublimation fastness tester	1		15000
35.	Round Sample of GSM with Electronic balance	1	35000	35000
36.	Stiffness Tester	1	15000	15000
37.	Drapemeter	1	25000	25000
38.	Fabric Thickness Tester	1	8000	8000
39.	A.S.T.M. Cards For Threads/Inch	1		

NOTE:

1. Item No. 20 is not required for Textile Chemistry course.
2. Indian make working laboratory models for the costly equipment be purchased if available.

PROCESS HOUSE

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Kier (Small Piolet Bleaching Plant)	1	200000	200000
2.	Working Model of Jigger	1	60000	60000
3.	Lab Model of Roller Printing Machine	1	80000	80000
4.	Dye Bath For Experimental Work	20	100	2000
5.	Spray, Block and Screen Systems of Printing	10 Set	300	3000
6.	Spray Printing Machine With Compressor	1	150000	150000
7.	Lab Model of High Temperature Beaker Dyeing Machine	1	33000	33000
8.	Lab Model of Padding Mangle Machine.	1	42000	42000
9.	Electrically Heated Steam Edger	1	24000	24000
10.	Electrically Operated Lab Stirrers			
	A. Fixed Type	1	3000	3000
	B. Movable Type	1	3000	3000
11.	Stenter(Electrically Heat Setting and Curing Machine)	1	75000	75000
12.	Lab Model of Hand Mercerising Machine	1	20000	20000
13.	Lab Model of Hank Dyeing Machine	1	15000	15000
14.	Lab Model of Winch Dyeing Machine (Open and Closed)	1	75000	75000
15.	Pressure Package Dyeing or Beam Dyeing Machine	1	100000	100000
16.	Hot Air Oven	1	25000	25000
17.	Vaccum Cleaner For Spray Printing	1	15000	15000

NOTE:

- Item No. 13,17,18 are not required for Textile Technology course
- Indian make working laboratory models for the costly equipment be purchased if available.

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 60 node 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		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		15
	and all other accessories related to Networking		
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	04	8,00000

	connectivity.(For 2 Labs)		
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

LIST OF LABORATORY EQUIPMENT(Energy Conservation)

Sr. No	Particulars	Qty	Estimated Cost (Rs)
1.	Multimeter	1	17,000
2.	Power Analyzer	1	20,000
3.	Luxmeter	1	5,000
4.	Black Box (for checking lamp efficacy including stand and luxmeter)	1	25,000
5.	Centrifugal pump, 1 kW	1	15,000
6.	Variable Frequency drive	2	50,000
7.	Water Flow meter	1	10,000
8.	Pressure Gauge	1	2,000
9.	Experimental Set up for Valve Throttling vs VFD	1	50,000
10.	Compressor, 20 cfm, single-stage	1	50,000
11.	Air leakage meter	1	18,000
12.	Blower (2 HP)	1	8,000

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

ote :

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

ANNEXURE - I

PROPOSED GUIDE
FOR
SECOND YEAR STUDENTS TO PREPARE THEIR INDUSTRIAL VISIT REPORT

1. Name & Address of the unit
2. Date of
 - i. Joining.
 - ii. Leaving.
3. Nature of Industry
 - i. Product & Capacity.
 - 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 and its layout.
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. Material Handling Equipments.
12. Discription 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.

ANNEXURE - II
TRAINEES ASSESSMENT

The Institute invites the comments on the work & behaviour of student during his stay in the industry from his 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

Signature of the Assessor

Date :-

Designation

ANNEXURE III

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

1. To launch and sustain functional literacy programmes.
2. To train the rural youth in different trades/skills.
3. Training by innovating and improving the efficiency of household gadgets.
4. To control and reduce pollution affecting 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, household gadgets and appliances of non conventional energy.
8. To help the rural youth in preparing project reports to set up industrial units and entrepreneurial development.
9. All community polytechnics shall render repair and maintenance of agricultural implements, appliances of non conventional energy, household gadgets etc and train the rural youth in such skills.

STUDENT ACTIVITIES ON ENERGY CONSERVATION/ENERGY EFFICIENCY

1. Presentations of Case Studies
2. Debate competitions
3. Poster competitions
4. Industrial visits
5. Visual Aids

COURSE OUTCOMES

After studying this course, a student will be able to co-relate and apply fundamental key concepts of energy conservation and energy management in industry, commercial and residential areas. A student will be able to:

- Define principles and objectives of energy management and energy audit.
- Understand Energy Conservation Act 2001 and its features.
- Understand various forms & elements of energy.
- Identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
- Identify areas of energy conservation and adopt conservation methods in various systems.
- Evaluate the techno economic feasibility of the energy conservation technique adopted.

INSTRUCTIONAL STRATEGY

Teachers are expected to lay considerable stress on understanding the basic concepts in energy conservation, principles and their applications. For this purpose, teachers are expected to give simple problems in the class room so as to develop necessary knowledge for comprehending the basic concepts and principles. As far as possible, the teaching of the subject must be supplemented by demonstrations and practical work in the laboratory. Visits to industries must be carried out. Expert from industry must be invited to deliver talks on energy conservation to students and faculty.

REFERENCE BOOKS

1. Guide book on General Aspects of Energy Management and Energy Audit by Bureau of Energy Efficiency, Government of India. Edition 2015
2. Guide book on Energy Efficiency in Electrical Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
3. Guide book on Energy Efficiency in Thermal Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
4. Handbook on Energy Audit & Environmental Management by Y P Abbi&Shashank Jain published by TERI. Latest Edition
5. **Important Links:**
 - (i) Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India. www.beeindia.gov.in.
 - (ii) Ministry of New and Renewable Energy (MNRE), Government of India. www.mnre.gov.in.
 - (iii) Uttar Pradesh New and Renewable Energy Agency (UPNEDA), Government of Uttar Pradesh. www.upneda.org.in.
 - (iv) Central Pollution Control Board (CPCB), Ministry of Environment, Forest and Climate Change, Government of India. www.cpcb.nic.in.
 - (v) Energy Efficiency Services Limited (EESL). www.eeslindia.org.
 - (vi) Electrical India, Magazine on power and electrical products industry. www.electricalindia.in.

ANNEXURE- IV QUESTIONNAIRE

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

SUBJECT: Questionnaire for ascertaining the job potential and activities of diploma holder in Textile Chemistry.

PURPOSE: To design and develop Three Year diploma curriculum in Textile Chemistry.

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 _____
Textile Chemistry.

6. Please give names of modern equipments/machines handled by a
diploma holder in Textile Chemistry.

1.	2.	3.
4.	5.	6.

7. What proficiencies are expected from a diploma holder in
Textile Chemistry.

1.	2.	3.
4.	5.	6.

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

1. Theoretical knowledge	-----%
2. Practical knowledge	-----%
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 Textile Chemistry.
- (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 Textile Chemistry.
15. In which types of organisations can a diploma holder in Textile Chemistry can work or serve.
- | | | |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
16. Job prospects for the diploma holder in Mechanical Engg. the next ten years in the state / country.
17. In your opinion what should be the subjects to be taught to a diploma student in Textile Chemistry.
- | | |
|--------|-----------|
| Theory | Practical |
|--------|-----------|

18. Kindly mention particulars regarding topics/areas which should be given more emphasis in 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 finalisation of curriculum.
21. What changes in technologies are to be incorporated in the development of curriculum in Textile Chemistry.

(Signature)

Kindly mail the above questionnaire duly filled to:-

Yogesh Singh
Professor
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)