Course Name : Diploma in Technical Chemistry

Course Code : DTC

Semester : Third

Subject Title : Physical Chemistry

Subject Code : 135CH33

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	3	80	32	20	100	40	50	20	-	-	25	10	175

RATIONALE:–

The study of Physical chemistry helps to understand the physico-chemical principles of the various wet processes and in manufacture and analysis of textiles.

OBJECTIVES:–

1. To understand physical and chemical properties of various processes.

2. To represent the formation of bonds in molecules.

Syllabus

Theory

No.	Contents	Hrs	Mks
	Section – I		
1	**Liquid state** Kinetic molecular description of liquid, Intermolecular forces, Concept & experimental determination: Vapour pressure, surface tension, viscosity. Molar refraction, optical activity	08	10

2	**Solutions** Mole Fraction, Molarity, and Molality, Vapour Pressure, Raoults law, colligative properties: Relative lowering of vapour pressure, depression in freezing point; elevation in boiling point; determination of molecular mass	10	20
3	**Colloidal Chemistry** Particle size & colloidal state, General methods of preparation of colloids, Optical & electrical properties of colloids, applications	08	10
	Section – II		
4	**Adsorption & Catalysis** Absorption & Adsorption, Physical and Chemical adsorption, Freundlich & Langmuir Isotherms. Catalysis: Types/ Classification, Mechanism, applications of catalysis	06	10
5	**Chemical Equilibrium** Reversible- Irreversible reactions, chemical equilibrium, Law of mass action & Equilibrium constants (K_P, K_C), Distribution law & distribution or partition coefficient & solvent extraction	08	15
6	. **Chemical Kinetics** Rate and Rate expression of a reaction; Rate constant; Order & Molecularity of reaction; Integrated rate expressions for zero, first, second & third order reactions; Half-life; Determination of rate constant and order of reaction; Factor Affecting the Rate of the Reactions: temperature, Arhenius equation, activation energy, catalyst	08	15
		48	80

Practicals

1. Surface tension of a liquid by stalagnometer.
2. Viscosity of a liquid by Ostwald's Viscometer.
3. Distribution of benzoic acid in water & benzene.
4. Distribution of iodine in water & carbon tetrachloride.
5. Adsorption of acetic acid on activated charcoal.
6. First order kinetics:
    i) Hydrolysis of methyl acetate.
    ii) Relative strength of the acid to catalyse the hydrolysis reaction
    iii) Hydrolysis of methyl acetate at three different temperature (30 ^{0}C, 40 ^{0}C, 50 ^{0}C) & to determine activation energy.
7. Second order kinetics:
    i) Sopanification of ethyl acetate.
    ii) Hydrogen peroxide & potassium iodide reaction

iii) Potassium persulphate & potassium iodide reaction

8. Specific rotation of cane sugar.
9. Determination of specific rotation of a given substance at different concentration & to determine the concentration of unkown solution.
10. Preparation of colloids: Sulphur sol, As_2S_3 sol, Sb_3S_3 sol.

Learning Resources:

Text Books: -

1. Essentials of Physical chemistry, B. S. Bhal & G. D. Tuli, Edition: 18 (2010),

   S Chand Group, New Delhi 110 055, INDIA.

Reference Books :-

Principles of Physical Chemistry, Puri & Sharma, Edition: 38 (2000), Shohan Lal Nagin Chand & Company, Jalandhar 114 004, India

Course Name : Diploma in Technical Chemistry

Course Code : DTC

Semester : Third

Subject Title : Introduction to Natural Fibers

Subject Code : 135CH35

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
4	-	-	3	80	32	20	100	40	--	--	--	--	--	--	100

RATIONALE:

The use of fiber for textile purposes is one of mankind oldest art. So the study of textile fibers has become a very interesting and challenging science The history of fiber development has been a surprising example of mankind's effort ever since fiber began to be used for apparel making. During last hundreds of centuries and until about 125 years ago, all the fibers employed were from natural sources.At present these fibers are termed as natural fibers e.g. cotton, flax, jute, wool and silk. A knowledge of the constitution, physical & chemical properties of natural fibers is very significant to the student learning wet processing of textiles.

Objectives:

The students will be able to:

- Get the knowledge of constitution, physical & chemical properties of natural fibres.
- Get to know the various definitions of terms used in the subject of Chemistry of Natural Fibers.

CONTENTS – THEORY

CHAPTER	NAME OF THE TOPIC	HOURS	MARKS
	SECTION – I		
01	**Introduction to fibre properties** Primary properties Fibre Length to Width ratio Fibre Uniformity Fibre Strength and Flexibility Fibre Extensibility and Elasticity	**6**	**10**

	Fibre Cohesiveness Secondary Properties Moisture Absorption and Desorption Fibre Resiliency and Abrasion Resistence Lustre Resistence to Chemicals in the Environment Density Thermal and Flammability Characteristics		
2	**CELLULOSIC FIBRES** **Chemistry of cellulose** **Cotton** Structural Properties Chemical Properties Physical Properties End-Use Properties	**12**	**20**
3	**Flax** Structural Properties Chemical Properties Physical Properties End-Use Properties **Other Natural Cellulosic Fibre Hemp** Jute Ramie	**6**	**10**
		24	**40**
	Section-II		
4	**PROTEIN FIBRES** **Wool, SILK** Structural Properties Chemical Properties Physical Properties End-Use Properties	**12**	**20**
5	**MINERAL AND METALLIC FIBRES** **Metal fibers** **Whiskers** **Glass fibers** Raw material, fiber formation, structure, physical properties, applications.	**12**	**20**
		24	**40**

Text Books: -

1. A text book of Fibre Science and Technology, S.P. Mishra, New Age International (P) Ltd. Publishers.

Reference Books :-

Technology of Fibre Processing, Vol.-I Textile Fibre, Prof. V.A. Shenai, Sevak Publications.

Course Code : DTC

Semester : Third

Subject Title : Basics of Manmade fibers

Subject Code : 135CH32

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
4	-	-	3	80	32	20	100	40	--	--	--	--	--	--	100

RATIONALE:

A knowledge of the constitution, physical & chemical properties of man-made fibres along with manufacturing techniques of the synthetic fibres go a long way in assisting the student to understand various wet processing treatments like bleaching, dyeing, printing & finishing given to the fabric after its manufacture.

Objectives:

The students will be able to:

- Get the knowledge of constitution physical & chemical properties of man-made fibres.
- Get the knowledge of raw materials and their conversion into precursors for polymerization process

CHAPTER	NAME OF THE TOPIC	HOURS	MARKS
	SECTION – I		
01	**Fibre Formation and Morphology** Polymer formation Fibre Spinning – **Dry Wet Melt** Fibre Drawing and Morphology Bulking, Texturizing and Staple Formation Heat Setting Techniques\Air Entaglement Differntial Setting	**6**	**10**

	Staple Formation Structure Property Relationships		
2	**Rayon** Structure Property and Formation of Rayon **Viscose Rayon,** **Polynosic rayon** **Cupraammonium Rayon**	**12**	**20**
3	**CELLULOSE ESTER FIBRES** **Acetate and Diacetate, Triacetate** Structural Properties and Formation Chemical Properties Physical Properties End-Use Properties	**6**	**10**
		24	**40**
	Section-II		
4	**POLYAMIDE FIBRES** **Nylon 6 and Nylon 6,6** Structural Properties Chemical Properties Physical Properties End-Use Properties	**9**	**15**
5	**POLYESTER FIBRES** **Polyethylene Terephthalate** Structural Properties Chemical Properties Physical Properties End-Use Properties **Poly -1,4-Cyclohexylene dimethylene terephthalate** **Other Polyesters** Poly–p-Ethyleneoxybenzoate Modified Terephthalate Polyesters	**9**	**15**
6	**ACRYLIC FIBRES** **Acrylic** Structural Properties Chemical Properties Physical Properties End-Use Properties **Modacrylic** Structural Properties Chemical Properties Physical Properties End-Use Properties **Other Acrylics**	**6**	**10**
		24	**40**

Learning resourses:

Text Book

- A Text book of Fiber Science and Technology by S.P.Mishra, New Age International (P) Ltd.
- Textile Fibers, Dyes, Finishes and Process by Howard Needles, Standard Publishers Distributors.

Reference books:

- Manufactured Fiber Technologyby V.B.Gupta and V.K.Kothari. Chapman and Hall.
- Hand book of Textile Fibers by J.G.Cook, Merrow Publishing Co Ltd.

Course Name : Diploma in Technical Chemistry
Course Code : DTC
Semester : Third
Subject Title : Industrial Chemistry
Subject Code : 135CH34

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	3	80	32	20	100	40	50	20	-	-	25	10	175

Rationale:–
Many inorganic chemicals are used in textile processing for their acidic, basic, oxidizing & reducing properties. To understand these characteristics, related compounds are included. Basic insight to the use of chemicals particularly in textile industry is essential. A brief overview of the trends in periodic table is essential to understand the properties of industrial chemicals and coordination compounds in detail.

Objectives:–
1. To understand properties of inorganic compounds.
2. To understand synthetic methods of inorganic compounds.

Syllabus

No	Contents	Hrs	Mks
	Section I		
1	**Periodic Table** Long form of the periodic table, classification of periodic table according to electronic configuration, Trends in periodic properties like Ionization potential, electron affinity, electronegativity, oxidation states, atomic and Ionic radii. Characteristics of d- and f-block elements.	06	10
2	**Coordination chemistry** Coordination compounds, co-ordination number, ligands, types of ligands, Werner's coordination theory, geometry of complex salts, detection of coordination compounds, uses of coordination compounds, chelates, classification of chelates, Uses of chelating agents, important sequestering agents	9	15

3	**Bleaching Agents** Preparation, properties, and uses of bleaching powder and Sodium of Hypo chlorite Electrolytic method manufacturing hydrogen peroxide, physical and chemical properties and uses of H_2O_2.	9	15
	Section II		
4	**Chemistry of Industrial Compounds – I** Manufacture, Properties and Uses of some important chemicals Ammonia-manufacture of ammonia by Haber's process, physical & chemical properties and uses. Sulphuric acid: Manufacturing of Sulphuric acid by contact process, Physical and Chemical properties and uses. Hydrochloric acid: Manufacturing of HCl from common salt, physical & chemical properties & uses. Nitric acid: Manufacturing of HNO_3 from ammonia (Ostwald's nitric acid method), physical & chemical properties & uses	12	20
5	**Chemistry of Industrial Compounds – II** Manufacture, Properties and Uses of some important chemicals Sodium Compounds--NaOH, Na_2CO_3, $Na_2S_2O_3$ Chromium Compounds—$K_2Cr_2O_7$ Manganese Compounds— $KMnO_4$ Copper Compound— $CuSO_4$	12	20
		48	80

Practicals:

1. To prepare 0.1 N and 0.01 N solution of primary standard: sodium carbonate.
2. To prepare 0.1 N and 0.01 N solution of primary standard: sodium chloride.
3. To prepare 0.1 N and 0.01 N solution of primary standard: potassium dichromate.
4. To prepare and standardize 0.1 N NaOH solution
5. To prepare and standardize 0.1 N $Na_2S_2O_3$ solution.
6. To prepare and standardize 0.1 N $KMnO_4$ solution.
7. To prepare and standardize 0.1 M EDTA solution.
8. To estimate percentage purity of hydrogen peroxide.
9. To estimate percentage purity of bleaching powder.
10. To estimate percentage purity of ferrous ammonium sulphate.

Learning Resources:-

Text Book:-

1. Dryden, C. E. Outlines of Chemical Technology (Edited and Revised by M.Gopal Rao and Sittig .M) East West Press. New Delhi,3 rd Edition(1997).
2. Modern Inorganic Chemistry By Madan R D. S Chand & Company New Delhi 2009 Edition

Reference Books:-

1. A Text Book of Inorganic Chemistry – A. K. De Edition 1995.

Course Name : Diploma in Technical Chemistry

Course Code : DTC

Semester : Third

Subject Title : Professional Practices

Subject Code : 135CH37

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
-	2	-	--	--	--	--	--	--	--	--	--	--	25	10	25

RATIONALE

While working in Chemistry laboratories the student has to be fully aware of the necessary hazards while handling chemicals. The information in Safety and Chemical handling help in conducting the work-safely.

COURSE CONTENTS:

S.N.	Contents	Hours Reqd.	Marks Alloted
1.	General rules for laboratory safety, safety organisation in a chemical industry, safety education and safety training, development of safety consciousness.	**02**	
2.	Laboratory design and equipment, general configuration, furnitures, equipments, fume hoods and ventilation, sinks, equipment safeguards, electrical connections, storage of chemicals, house-keeping, fire protection.	**02**	
3.	Glassware, inspection and storage, setting up of apparatus, glass and	**02**	
4.	Handling and storage of containers, safe storage of flammable liquids, cylinders, cans pressure regulators, drums.	**01**	
5.	Hazards, non-chemical burns, ladders and tools, hand tools, electrical hazards, steam lines, brine lines, spillage of chemicals on work-bench or on floor.	**01**	

6.	Flammability, Flammable materials, fire hazards properties, flalsh point, ignition temperature, explosive or flammable limits, explosive range, extinguishing agents, water, foam, carbon dioxide, gas fires, dusts, prevention of dust explosions.	**04**	
7.	Chemical hazards, acids and alkalies, hazardous effects of hydrofluoric acid, sulphuric acid, chloro sulphonic acid, nitric acid, chronic acid, hydrochloric acid, phosphoric acid, acetic acid, formic acid, sodium hydroxide, potassium hydroxide, calcium hydroxide, ammonium hydroxide, chlorates, chromates, perchloric acid, hydrogen peroxide, sodium chlorite.	**06**	
8.	Explosive power of acetylides, silver fulmiate, nitrogen containing compounds, peroxides, per acetic acid, liquid oxygen, chlorine and etheylene, sodium metal and calcium carbide.	**02**	
9.	Toxicity, hazards of toxicity, types of exposure (skin and eyes, inhalation, swallowing, injection), warning senses, tolerance and sensitivity, toxicity of sodium hydroxide, phenol, nitirc acid, bromine, calcium chloride, aniline.	**04**	
10.	Pressure vessel hazards, safety devices, cylinders, bomb reactors, boilers, refrigeration equipment, and storage tanks.	**02**	
11.	Clothing and personal protective equipment, eye protection, body protection, respiratory protection, foot protection, hand protection.	**02**	
12.	Laboratory first-aid, antidotes, burns, eye injuries, poisoning, poisoning by swallowing of cyanides, hydrofluoric acid, arsenic compounds, mercury and lead compounds, universal antidote.	**04**	
		32	

BOOKS FOR REFERENCE:

Text Books: -

1. The CRC Handbook of Laboratory Safety, Fifth Edition

Reference Books:-

1. Guide for Safety in the Chemical Laboratory, Manufacturing Chemists Association Znc; D.Van Nostrand Company, Znc; New York, 3rd Reprint, 1962.
2. Merc Index.199952

Course Code : DTC

Semester : Third

Subject Title : Basics of Spinning

Subject Code : 135TM31

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	3	80	32	20	100	40	--	--	--	--	50	20	150

DTC- Basics of Spinning

RATIONALE:

In processing many times only yarn is dyed (coloured). This requires the basic knowledge of yarn production and characteristics and properties of yarns of different material.

This subject intends to impart the basic knowledge of spinning.

Objectives:

The students will be able to:

1. Get the knowledge of various raw materials used in spinning.
2. Predict the properties of yarns produced from the spinning process.
3. Get the skills to identify/differentiate between yarns produced by different spinning methods e.g. ring spinning, open-end spinning etc.

	Section I		
S.N.	**Contents**	**Hours**	**Marks**
1.	Classification of Textile fibres, essential and desirable properties of textile fibres. Staple fibres and filaments.	4	8
2	Yarn numbering system. Definitions of Count, Tex and Denier and conversion from one system to other.	6	8
3	Spinning of staple fibres. Objects of the various processes involved i.e.blowroom, carding, draw frame, combers, fly frames, ring frames. Difference between carded and combed yarns.	6	10
4	Doubled yarns and calculation of resultant count. Various types of fancyyarns and their structure.	8	14

	Section-II		
5	Structural differences between yarns spun on rotor spinning, friction spinning, air-jet spinning, self-twist spinning, and twist-less spinning, Comparative yarn properties from different processes.	8	14
6	Brief descriptions of the methods of man-made fibre production i.e. melt, dry and wet spinning.	2	4
7	Differences in processing of man-made fibres and their blends.	8	12
8	Textursing of filament yarns – different methods and textured yarn properties.	6	10

PRACTICALS:

Experiments:

1. Study of various sections of blow room – openers, beaters, cages and lap forming, mechanisms.
2. Observation of card and its various parts.
3. Study of the comber.
4. Demonstration of draw frame.
5. Demonstration of fly frame – stop motions, drafting, twisting and building mechanisms.
6. Demonstration on ring frame.
7. Study of the doubler and two for one twister.
8. Demonstration on rotor spinning machine.
9. Demonstration of the melt spinning machine.

Text Book: -

1) Textiles -by A. Wynne - The Motivate Series, Macmillan

Reference Books:-

1) Textiles - By Norma Hollen, Jane saddler and Anna Langford, Macmillan Publishing Company.

Course Name : Diploma in Technical Chemistry

Course Code: DTC

Semester : Third

Subject Title: Development of Life Skills

Subject Code: 135HM36

Teaching and Examination Scheme:

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		Pract		Oral		Termwork		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
-	-	2	-	-	-	-	-	-	-	-	-	-	25	10	25

Rationale

Anyone aspiring for professional success in various fields of technology and management has to make a quick and lasting impact on the employers at different levels of his/her career. Effective communication skills is a necessity today and a mastery of both productive skills and managerial skills will enable students, job seekers and technologists in industry to realize their goals of entering either a prestigious institution or getting a coveted job. Their oral skills will enable them to perform better during interviews, group discussion, and presentation and while delivering speeches. Presentation skills will give the students confidence, foster team spirit and enhance their power of expression which will be helpful for them in future while holding seminars and conferences. Further, all

competitive exams are exacting and require students to be proficient in the written form. All writings in industries and management require responsible and formal communication. Powerful written communication is possible only by understanding the basics of various kinds of formal writing like summaries and resume. Ability to write honest and impressive resumes is imperative in order to secure a job of one's choice. In addition, managerial skills like time management, body language and positive thinking will shape their personality and enable all round development.

Thus it can be concluded that efficacious communication in verbal and nonverbal form is indeed the sure gateway to success in the professional world.

Objective

1. To train students in overcoming stage fright, to attain composure, to organize thought process and develop voice modulation and body language.

2. To develop students' interpersonal skills and leadership quality, to improve their listening and persuasive skills, and train them in the ways of identifying the source of information, collecting and planning .

3. To prepare students for interview, make them aware of personal grooming and concept of time , to teach students positive thinking as an ongoing process, to have optimistic approach, , to cultivate right values and attitude.

LEARNING STRUCTURE:

Application:

To enable the students to communicate effectively through oral communication and presentation skills

Procedures:

1. Techniques of communicating confidently

2. Principles governing the appropriate use of verbal communication

3. Techniques of effective speaking

Principles:

1. Principles of management in communication skills

2. Principles of appropriation and contextualization of the use of non-verbal communication

Concept:

1. Concept of oral and written skills

2. Concept of manners, etiquette and personality development

3. Concept of time management and interview techniques

Facts:

1. Theory of communication

2. Theory of oral skills

3. Formats of resume and summarization

SYLLABUS

Sr. No.	Topic	Hours
01	**Oral Skills and Writing Skills** • Elocution • Group Discussion	4

	• Presentations • Technical paper presentation • Planning and preparing for an industrial visit • Written report on an industrial visit	4 6 2 2 2
02	**Managerial Skills** • Interview Techniques • Resume • Time Management • Manners & Etiquette • Personality Development • Positive thinking	 2 2 2 2 2 2 2
	Total	**32**
03	**Practical** 1. Students deliver a prepared speech. 2. Group discussions conducted in class 3 .Group of 6-7 students make a power point presentation 4 .Assignments on resume writing . 5. Mock interviews in class 6. Role play by students.	

Term Work- Students should submit term work file based on above topics.

Skills to be developed for practical:

Intellectual Skills:

1. Skills of elocution

2. Collecting and summarizing information

3. Drafting and presenting

Motor Skills:

1. Use of appropriate body language and oral skills

Text Book:

1. Business Communication- Raman Meenakshi, Oxford, India,First edition, 2008

Books for Reference:

1. Contemporary Management, Gupta C. B., APH, New Delhi, First edition, 1992

2. Organisational Behaviour, Sekaran Uma, Tata Mcgraw Hill, New Delhi, Second edition,2008

3. Technical Communication, Raman Meenakshi, Sharma Sangeeta, OUP, India, Second impression, 2004