Course Name : **Diploma in Technical Chemistry**
Course Code : **DTC**
Semester : **First**
Subject Title : **Mathematics - I**
Subject Code : **135MA11**

Teaching & Examination Scheme

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
				Theory		Test	Total		Pract		Oral		Termwork		
L	T	P		Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	2	-	3	80	32	20	100	40	-	-	-	-	25	10	125

Rationale: -
Mathematics is the foundation stone for studies in all branches of Technology. This subject helps students to develop logical thinking which in turn is useful in understanding the principles of all other subjects. Analytical and systematic approach towards any problem is developed by learning mathematics.

Objective: -
1. To teach students basic facts, concepts and principles of mathematics as a tool to analyze engineering problems.
2. To make students well versed in the prerequisites for further studies in Mathematics.

Syllabus

Part – I : Theory

SECTION - I				
No.	Chapter	Contents	No. of Hours	Marks
1	**Binomial Theorem**	1.1 Concepts of Permutations and Combinations and problems based on $^{n}P_{r}$, $^{n}C_{r}$ 1.2 Binomial Theorem with positive integral index, general term.	08	10
2	**Determinants**	2.1 Determinant of order three. 2.2 Cramer's rule. 2.3 Properties of determinants	05	12
3	**Straight lines**	3.1 Equations of straight lines in different forms. 3.2 Conditions for two parallel and Perpendicular straight lines.	05	08

4	**Function**	4.1 Definition of function. 4.2 Types of Functions, composite function. 4.3 Simple problems based on function	05	10
5	**Trigonometry**	5.1 Circular measure of an angle, Conversion from degrees to radians and radians to degrees. 5.2 Trigonometric ratios of angle in four quadrants. 5.3 Compound angle formulae. 5.4 Allied angle formulae. 5.5 Product formulae, Sum or difference formulae. 5.6 Multiple, submultiples angle formulae. 5.7 Inverse trigonometric functions.	16	28
6	**Limits**	6.1 Concept of limit of a function. 6.2 Theorems on limits (Without proof) 6.3 Limits of algebraic, trigonometric functions. 6.4 Standard limits	09	12
		Total	**48**	**80**

REFERENCE BOOKS:

1) Basic Mathematics -   B.M.Patel, J.M.Rawal and others -   Nirali Prakashan.
2) Mathematics for Polytechnic - S. P. Deshpande- Pune Vidyarthi Griha Prakashan.

Course Name : **Diploma in Technical Chemistry**
Course Code : **DTC**
Semester : **First**
Subject Title : **Physics-I**
Subject Code : **135PH12**

Teaching & Examination Schemes

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
				Theory		Test	Total		Pract		Oral		Termwork		
L	T	P		Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	3	80	32	20	100	40	25	10	-	-	25	10	150

Rationale:–

Various phenomena, principles, laws, rules discovered and invented by physics are used for industrial, engineering and technological applications. The overall growth of various engineering disciplines, namely, mechanical, electrical, electronics, civil and environmental and so on depends upon the development of physics and its detail understanding.

For sustainable socio-economic development of country research techniques in engineering are required. While identifying and solving any field problem, scientific facts and results should be considered; and in this process physics plays a pivotal role. Different branches and sub-branches of physics, viz, dynamics, optics, acoustics, material science, semiconductor physics, nuclear physics and so on provide fundamental facts, laws and logical sequencing to streamline engineering and technological problems.

Objectives:–

Students should be able to;
- Identify different systems of units and convert units from one system to other as well as conversant with practical units.
- Estimate and minimize the errors.
- Select proper measuring instrument considering least count, range and precision required.
- Select appropriate materials required for a specific purpose by studying properties of materials.
- To understand specific heat, gas laws, expansion, thermal conductivity and thermodynamics.
- Analyze rectilinear, circular and simple harmonic motion and use it for solving engineering problems.
- To understand the concepts of electric charge and its fundamentals.
- Identify, analyze and understand the principles of light with the study of physics.

Syllabus

Part – I : Theory

No.	Chapter	Contents	No. of Hours	Marks
SECTION - I				
1	**Measurements**	1.1 Units Necessity of measurement, concept of unit of a physical quantity, requirements of standard unit, Various system of units (CGS, MKS, SI, FPS), conversions, practical units, fundamental and derived physical quantities and their units, dimensions and dimensional analysis 1.2 Errors Accuracy, precision of instruments, errors, types of errors, minimization of errors, significant figures, problems 1.3 Measuring instruments Vernier caliper, micrometer screw gauge, perimeter, thermometer, galvanometer, voltmeter, ammeter with least count and range, errors in them and correction to it.	10	15
2	**Properties of matter**	2.1 Elasticity Deformation, restoring force, stress, strain, Hooke's law, Moduli of elasticity (Young, bulk and rigidity), relation between them, problems, stress-strain diagram for some materials (steel, aluminium, cast iron, concrete), breaking stress, factor of safety. 2.2 Viscosity Newton's law of viscosity, coefficient of viscosity, unit, streamline and turbulent flow, critical velocity, Reynold's number, problems, Stokes' law, determination of viscosity, factors affecting viscosity.	5	10
3	**Gas laws and specific heats**	Boyle's law, Charle's law, Gay-Lussac's law, Kelvin scale of temperature, general gas equation, universal gas constant, N.T.P., principal specific heats and relation between them, problems.	10	15
SECTION - II				
4	**Expansion, heat transmission and laws of thermodynamics**	Expansions of solids–linear, aerial and cubical, relation between them, modes of transmission of heat, coefficient of thermal conductivity, good and bad conductors and applications, Searle's	10	15

		and Lee's method, laws of thermodynamics, isothermal, isobaric, isochoric and adiabatic processes, problems.		
5	**Wave theory of light**	5.1 Huygen's theory, wavefronts, wavenormals, laws of reflection and refraction, total internal reflection, dispersion, angle of deviation, problems 5.2 Interference and diffraction Principle of superposition, constructive and destructive interference, conditions to obtain steady interference pattern, Young's double slit experiment, diffraction, single slit and many slits diffraction, grating, applications, problems.	8	15
6	**Static Electricity**	Coulomb's Law, Electric Field, Intensity of Electric field and Electric Potential, Capacitance, capacitors in series and parallel .	5	10
			48	**80**

Part II:- Practicals

List of experiments:-
 (10 experiments should be performed)
1. Use of vernier caliper and observations with traveling microscope
2. Use of micrometer screw gauge
3. To Calculate percentage error in vernier caliper and micrometer readings.
4. To determine specific heat of a solid by Regnault's method.
5. Determination of coefficient of viscosity using Stokes' method
6. To determine refractive index of a glass slab.
7. To determine grating element of diffraction grating using LASER.
8. To determine wavelength of LASER by diffraction grating.
9. Determination of thermal conductivity of good conductor by Searl's method.
10. Determination of thermal conductivity of bad conductor by Lee's disc method

Learning Resources:-

Text Book: -
   Engineering Physics by Gaur R. K. and Gupta S. L., Dhanpat Rai Publications, New Delhi, Eighth Edition, 2001., Physics Text Book of 11th & 12th std.(NCERT)

References:-
1. Fundamentals of Physics Extended, By Halliday D., Resnik R. and Walker, Wiley – India, New Delhi, Eighth Edition, 2008.
2. Physics for scientists and Engineers by Serway R. A. and Jewett, Jr. J. W., Thomson Learning (Indian reprint), New Delhi, Sixth Edition, 2007.

Course Name :   **Diploma in Technical Chemistry**
Course Code :   **DTC**
Semester :   **First**
Subject Title :   **Basic Chemistry**
Subject Code :   **135CH13**

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
				Theory		Test	Total		P		OR		TW		
L	T	P		Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	3	80	32	20	100	40	25	10	-	-	25	10	150

Rationale:–

Chemistry is a basic science subject which is essential to all engineering courses. It gives knowledge of engineering materials, their properties, related applications & selection of materials for engineering applications.

Due to technological progress there are hazardous effects on environment & human life. The core knowledge of environmental effects will bring awareness in students about the precautions & preventions to be taken to reduce the ill effects.

This subject will generate curiosity of carrying out further development in engineering fields.

Objectives:–

1. To understand mole concept and volumetric analysis.
2. To represent the formation of bonds in molecules.
3. To describe the mechanism of redox reactions.

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Syllabus
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Part – I : Theory

SECTION - I				
No.	Chapter	Contents	No. of Hours	Marks
1	**Solution**	Solution, Concentrations of solution: Grams per litre, Percentage by weight or volume, Normality, Morality, Molality. Volumetric analysis, Titrations, Acid base titration, Acidimetry, Akalimetry, Redox titration, Iodometric titrations, Complexometric titration, Precipitation titration.	10	15
2	**Atomic Structure and Chemical**	Definitions of Elements, atoms, Molecules, Fundamental particles of atom, their mass, charge, location,	10	15

		Bonding	Definition of atomic number, atomic mass number, Isotopes and Isobars, Electronic configuration based on Hunds Rule, Aufbau's principle, Pauli's exclusion principle (till Atomic no. 30), Definitions: atomic weight, equivalent weights of an element, Molecular weight, Mole in terms of number, mass, volume, Determination of percentage composition of an element in a given molecule, Chemical bond, octet rule, formation of various types of chemical bonds: Covalent, Ionic, Coordinate covalent bonds along with examples CH_4, H_2, O_2, N_2, $NaCl$, $MgCl_2$, H_3O^+, NH_4^+, BF_3-NH_3		
3	Redox Reactions		Introduction, Oxidation, Reduction, Electron transfer concept, Oxidising & reducing agents, Redox reactions in aqueous reactions, Oxidation number & rules for assigning oxidation number, Balancing of the chemical reaction	06	10
	SECTION - II				
4	Ionic Equilibrium:		Definitions & theories of acids & bases:Classical theory, Arrhenius theory, Lowry-Bronsted theory,Lewis theory, pH, pOH, pH scale, Basicity of an acid and acidity of a base, Numericals of Equivalent weight of acids, bases, Definition of salts & types of salts: Normal, Acidic, Basic, Mixed, Double salts, complex salts, Electrolytes, Types of Electrolytes,Degree of dissociation, ostwalds dilution law, Hydrolysis & Degree of hydrolysis, common ion effect, solubility product and Numericals	10	15
5	Chemical reactions & Chemical Kinetics		Definition of Chemical reaction, types of chemical reaction, Rate of chemical reaction, Rate equation and rate law, order of reaction, Molecularity of reaction, differential rate equations, pseudo order reactions.	07	15
6	Environmental Chemistry		Introduction, Definition pollution, types of pollution, Air & Water pollution their causes, Acid rain, Ozone layer formation and depletion, Green House effect, Global warming, E waste, Radioactive pollution	05	10
				48	80

Part II:- Practicals

List of experiments:-
1. To study the use of indicators, for identification of acid, base and neutral solutions from the given set of solutions.
2. To standardize HCl solution using N/10 Na_2CO_3.
3. To standardize $KMnO_4$ solution using N/10 $C_2H_2O_4$ solution.
4. To standardize EDTA solution using N/10 $ZnSO_4$ solution.
5. To standardize $AgNO_3$ solution using NaCl solution.
6. To determine strength of the mixture of H_2SO_4 + $C_2H_2O_4$ using NaOH and $KMnO_4$ solution.
7. To determine the amount of ferrous sulphate or ferrous ammonium sulphates in the given solution using $KMnO_4$ solution.
8. To standardize $K_2Cr_2O_7$ solution using N/10 $Na_2S_2O_3$ solution.
9. To determine the amount of ferrous sulphate or ferrous ammonium sulphates in the given solution using $K_2Cr_2O_7$ solution.
10. To determine the amount of copper sulphate in the given solution using $Na_2S_2O_3$ solution.

Learning Resources:

Text Books
1. Essentials of Physical chemistry B. S. Bhal & G. D. Tuli, Edition: 18Th (2010) S Chand Group,New Delhi.
2. A Text Book of Chemistry Shashi Chawla Educational & Technical Publishers Dhanpat Rai & Co. (Pvt.) Ltd, Edition: Third (2005)
3. Engineering Chemistry Jain & Jain Dhanpat Rai & Co. (Pvt.) Delhi – 110006 Ltd Edition: Fifteenth (2008)

Reference books

1. Selected Topics in Inorganic Chemistry By: Wahid U Malik, R.D.Madan, Tuli G.D. S Chand Group,New Delhi, Edition: 17 (2006)2.

Course Name: Diploma in Engineering and Technology.
Course Code   : DTC
Semester   : First
Subject Title   : Communication Skills- I
Subject Code   : 135HM14p

Teaching Scheme			Paper Hours	Examination Scheme												Total Marks
				Theory		Test	Total		Pract		Oral		Term work			
L	T	Pr		Max	Min		Max	Min	Max	Min	Max	Min	Max	Min		
3	2	-	3	80	32	20	100	40	-	-	-	-	25	10		125

Rationale:
Technicians in industry require grammatically correct written and oral communication. In order to develop the abilities in students a text has been introduced. The tutorials have been incorporated to provide practice to the students to develop writing skills. Further exercises have been included for improving written and oral communication, apart from the basic grammar topics.

Objectives:
 Developing the skills of comprehension of passages, building vocabulary and ability to express through oral and written communication, improving skills of composition, and helping them formulate grammatically correct sentences and express ideas effectively.

LEARNING STRUCTURE
Application:
To enable students to comprehend the meaning of new words, use grammar to write correct answer to the questions and develop paragraphs

Procedure:
1. Technique of providing responses to short and long questions
2. Technique of application of grammar
3. Procedure for writing paragraphs
4. Technique of referring to dictionary and thesaurus

Principles:
1. Principles of formation of sentences
2. Principles of identification of various aspects of grammar
3. Principles to develop the theme of paragraph

Concepts:
   1. Concept of comprehending the text
   2. Concept of Time
   3. Concept of classifying types of paragraphs

 Facts:

1. Content of the text
2. Part of speech: Tenses, Verbs etc.
3. Topic sentences

COTENTS: theory

Section I

Name of Topic	Hours	Marks
PART I: TEXT- Communication Skills-I compiled by Mrs. R. Thomas *Vocabulary-Understanding meaning of contextual words - Understanding the passage, discussing the theme and expressing it appropriately Answering short questions Descriptive answers to judge comprehension as well as the ability to express * Identifying parts of speech to improve day to day oral communication	18	15 15
Paragraph Writing/ Short composition How to write a paragraph /short composition (Exercises given in assignment 4)	6	10
Total	**24**	**40**

Section II

NAME OF TOPIC	Hours	MARKS
PART II: Application of Grammar • Verbs: Subject –verb- agreement • Using appropriate Tenses according to the suitability and time elements(correction of tenses in paragraphs written by students) • Correction of commonly misspelled words • Identifying Common errors in English language	10	15
PART III: Comprehension	04	10
PART IV: Vocabulary Building • Use of synonyms/ antonyms/ homonyms /homophones/ One word substitute • Idioms /phrasal verbs Technical vocabulary (usage of appropriate technical words in a passage)	10	15
Total	**24**	40
TOTAL (SEC I & SEC II)	**48**	**80**

Term work will consist of 16 assignments.

Skills to be developed :

Intellectual Skills:
1. Skills of Speaking correct English
2. Exploring details and its application.
3. Reporting Skills and expressing effectively

Motor Skills:
1. Use of appropriate body language
2. Diction and Enunciation

Listening Skills:
1. Skills of listening and Comprehension

List of Assignments:
1. Building Vocabulary – (14 hrs – 7 assignments)
    - 20 words for each assignment of synonyms/ antonyms/ homonyms /homophones/ One word substitute
    - 20 idioms /phrasal verbs

2. Grammar – (10   hrs – 5 assignments)
    - Subject –verb agreement
    - Tenses
    - Correction of tenses in the passages written by students.

    - Usage of appropriate spellings
    - Errors in English
        Find out the errors and rewrite the sentences given by the teacher. (20 sentences)
3. Write paragraphs/ short composition on given topics (4 hrs)
    - Engineers – Nation Builders
    - An unforgettable incident
    - Narrate your long term goal in life.
    - Biography of a person who inspired you.

4. Passages for comprehension (4hrs)

Learning Resources:
Text Book: Communication Skills I- Compiled by Mrs. Thomas, H&M Dept

Reference Books:
1. Contemporary English grammar, structure and composition, Green David, Macmillan, India, First edition, 2000.
2. English grammar and composition, R. C. Jain, Macmillan, India, First edition, 2005.
3. Thesaurus, Rodgers, Oriental Longman
4. Dictionary, Oxford, Oxford University
5. Dictionary, Longman, Oriental Longman
6. English for Practical purposes, Patil Z. N. et al, Macmillan, India, 2004
7. English at Workplace, Sanyal Mukti, Macmillan, India

Course Name : Diploma in Technical Chemistry
Course Code : DTC
Semester   : First
Subject Title   : Chemistry of Aliphatic Compounds
Subject Code : 135CH15

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hour	Examination Scheme												Total Marks
				Theory		Test	Total		P		OR		TW			
L	T	P		Max	Min		Max	Min	Max	Min	Max	Min	Max	Min		
3	-	3	3	80	32	20	100	40	25	10	-	-	25	10		150

RATIONALE:

Organic chemistry is one of the subjects that provide the basic knowledge of the organic   compounds, which are used in all types of processes in chemical processing of the   textiles. The textile chemist should possess this knowledge to anticipate the effects of the chemicals used during the processing not only to control the process but also to avoid the reprocessing in the wet processing. Synthetic dyes and auxiliaries are based on organic chemistry and are used in the chemical processing very widely. This subject is intended to impart necessary knowledge in this area.

OBJECTIVES:

The students will be able to:
• Understand the fundamentals of dyestuffs.
• Understand the fundamentals of auxiliaries.
• Conceive thorough ideas regarding the role of organic chemicals in textile wet processing.
• Understand the use of organic chemicals in laboratories.

Syllabus

Part –I Theory

No.	Chapter	Contents	No. of Hours	Marks
Section – I				
1	**Basic concepts of organic chemistry**	Revision of Electronic theory, concept of valency, types of bonds (ionic and covalent), catenation	06	10
2	**Introduction to organic chemistry**	Classification of organic compounds: structure & functional groups, types of organic reactions (addition, substitution, elimination and rearrangement)	04	07
3	**Alkanes, Alkenes & Alkyenes**	Introduction, general formulae, nomenclature, sources of aliphatic compounds, general characteristics of each, applications	08	13
4	**Alcohols**	Introduction and nomenclature, definition of primary, secondary and tertiary alcohols, physical and chemical properties, applications	06	10
Section-II				
5	**Aliphatic aldehydes & ketones**	Introduction and nomenclature, physical and chemical properties, applications	06	10
6	**Carbohydrates**	Introduction to carbohydrates, classification, sources, structure and properties of starch and cellulose	06	10
7	**Esters / Oils & Fats**	Introduction to oils and fats, sources, structure and significance	06	10

8	**Aliphatic amines & Proteins**	Introduction to aliphatic amines Study of amino acids and proteins, sources, structure and significance	06	10
			48	**80**

Part II:- Practicals
Practicals:
1. Qualitative analysis of organic compounds (Five Compounds)
2. Quantitative analysis of organic compounds: volumetric analysis

Learning Resources:
Text Book :-
1. A Text Book Of Organic Chemistry By Arun Bahl, B S Bahl

    S Chand & Company Pvt Ltd. New Delhi, 15Th Edition 2000
2. TYBSc CHEMISTRY Practical Booklet .

Reference Books :-
1. Organic Chemistry Vol -I – L. Finar sixth edition

Course Name	: Diploma in Technical Chemistry
Course Code	: DTC
Semester	: First
Subject Title	: Engineering Graphics
Subject Code	: 135ME16

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
				Theory		Test	Total		Pract		Oral		Termwork		
L	T	P		Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
1	-	2	-	-	-	-	-	-	50	20	-	-	50	20	100

Rationale:–

This subject aims at making the students understand the fundamentals of Engineering Graphics which is a language used by Engineers for developing & expressing ideas & conveying the instructions which will be used to carry out jobs in the field of engineering.

At the first semester level the subject deals with drawing instruments & it's use , geometrical constructions, engineering curves, & orthographic projections. An introduction to computer drafting will be helpful in understanding the application of the subject in the industry. This subject will play very important role in designing, operation and maintenance areas of the existing and changing technological requirements of the modern world.

This course aims at building the foundation for further courses in drawing and other allied subjects.

Objectives:

The student will able to

- Understand the fundamentals of Engineering Graphics
- Read and interpret object drawings.

Syllabus

No	Topic		Contents	Hrs
1	Drawing Instruments & their uses	1.1	Letters & Numbers (Single stroke Vertical)	4
		1.2	Convention of Lines & it's applications	
		1.3	Geometrical Constructions involving construction of tangential arcs	

2	Engineering Curves	2.1	Ellipse by following Methods
			    1. Arcs of Circles Method
			    2. Concentric Circles method
			    3. Rectangle/Oblong Method
			    4. Eccentricity Method
				6

		2.3	Parabola by following Methods
			    1. Eccentricity Method
			    2. Rectangle Method	

		2.4	Hyperbola by Eccentricity Method Rectangular Hyperbola	
3	Projections of points & straight Lines		Planes of projections – HP, VP & PP Orthographic projections of points, Projections of Straight Lines with lines inclined to one reference plane only (Lines to be considered in first quadrant only. Simple problems excluding HT & VT of a line)	6
4	Projections of Planes		Projections of circular, square, rhombus, triangular, regular pentagonal & hexagonal plane surfaces with surfaces inclined to one reference plane & perpendicular to other. (excluding side view)	5
5	Orthographic Projections		Sectional Orthographic Projections of simple machine parts .(Full Section in one view)	9
6	Introduction to Computer Drafting		Introduction to different commands in the drawing software	2

Practicals

- A. The students should workout the problems on the following topics preferably on quarter imperial drawing sheets during the practicals.
    1. Two sheets on problems from geometrical constructions, lettering & types of lines
    2. Five Sheets on the topic of Engineering Curves.
    3. Four Sheets on Projections of Points & projections of Straight Lines.
    4. Three Sheets on Projections of Planes.
    5. Six Sheets on the topic of Orthographic Projections.
- B. Demonstration of drafting software to the students.

Text Books:-

1. Engineering Drawing : N.D.Bhat , Charotar Publishers,49th Edition 2010
2. Engineering Graphics & Engineering – S.T.Ghan, M.V.Rawalani- Nirali Publications-seventh Edition -2009

References:-

1. Engineering Drawing- D.A.Jolhe - TATA McGraw Hill- 2008
2. Engineering Graphics- K.R.Mohan – Dhanpatrai publishing co.-Ist edition-2009

Course Name : Diploma in Technical Chemistry
Course Code : DTC
Semester : First
Subject Title : Student Centered Activity/Test

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

Rationale:–

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Expert lectures, E-learning sources, E-library, Internet, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objectives:

The Student will be able to:

1. Acquire information from different sources
2. Prepare notes for given topic
3. Present given topic in a seminar
4. Interact with peers to share thoughts
5. Take the advantages of E-learning sources