ANNEXURE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name :All branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and film & TV.

Subject Code : 30014

Semester : I Semester
Subject Title : **ENGINEERING CHEMISTRY – I**

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per Semester: 15 Weeks

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

Topics and Allocation of Hours:

Sl. No	Topics	Time (Hrs)
1	Atomic Structure, Molecular Mass, Acids and Bases	13 Hours
2	Solutions, Colloids, Nano-Particles	13 Hours
3	Technology of Water, Catalysis, Glass	13 Hours
4	Electrochemistry, Electrochemical Cell, Energy Sources	13 Hours
5	Corrosion, Methods of Prevention of Corrosion, Organic Coatings	13 Hours
	Revision and Examinations	10 Hours
Total		**75 Hours**

RATIONALE:

The subject Engineering Chemistry creates foundation for understanding basic concepts of chemistry and its effects on Engineering Materials. Engineering Chemistry also impart knowledge of properties of materials and protecting them from corrosion and selecting right types of materials used in various fields of Engineering and Industry.

OBJECTIVES:

The objective of this Course is to make the student:

1. Study about the importance of Engineering Chemistry in industry.
2. Know about atomic structure, molecular mass and acids and bases.
3. Learn about solutions, colloidal particles and nano-particles.
4. Know about hardness of water, catalysis and glass.
5. Explain the details of electrochemistry, electrochemical cell and energy sources.
6. Understand corrosion and its prevention methods.

30014 ENGINEERING CHEMISTRY – I

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**ATOMIC STRUCTURE, MOLECULAR MASS, ACIDS AND BASES**	
	1.1 Atomic Structure	**4 Hrs**
	Atom – Definition – Fundamental particles of Atom – their Mass, Charge and Location – Atomic number and Mass number – Definition – Isotopes and Isobars – Definition with suitable examples – Formation of cation and anion by electronic concept of oxidation and reduction – Octet rule – Formation of electrovalent compound (NaCl) – Formation of covalent compound (NH_3).	
	1.2 Molecular Mass	**4 Hrs**
	Molecule – Molecular Formula – Molecular Mass – Mole – Definition – Simple calculations – Avogadro's Hypothesis – Relationship between Molecular Mass and Vapour Density – Avogadro Number – Definition.	
	1.3 Acids and Bases	**5 Hrs**
	Theories of Acids and Bases – Arrhenius Theory – Lowry – Bronsted Theory – Lewis Theory – Advantages of Lewis Theory – pH and pOH – Definition – Numerical problems – Indicator – Definition and Examples only – Buffer solution – Definition – Types of buffer solution with examples – Application of pH in Industries.	
II	**SOLUTIONS, COLLOIDS, NANO-PARTICLES**	
	2.1 Solutions	**4 Hrs**
	Definition – Methods of expressing concentration of a solution – Molarity, Molality, Normality, Mole fraction and Percentage Mass – Simple problems.	
	2.2 Colloids	**6 Hrs**
	True solution and Colloidal solution – Definition – Differences – Types of colloids – Lyophilic and Lyophobic colloids – Differences – Properties – Tyndall effect, Brownian movement, Electrophoresis and Coagulation – Industrial applications of colloids – Smoke Precipitation by Cottrell's method, Purification of water, Cleansing action of soap, Tanning of leather and Sewage disposal.	
	2.3 Nano-Particles	**3Hrs**
	Definition – Importance of Nano-particles – Area of application – Medicine, Electronics and Biomaterials.	

Unit	Name of the Topic	Hours
III	**TECHNOLOGY OF WATER, CATALYSIS, GLASS**	
	3.1 Technology of Water Sources of water – Reasons for depletion of underground water – Rain water harvesting (Basic ideas) – Advantages – Hard water and soft water – Hardness of water – Carbonate and Non-carbonate hardness – Methods of expressing hardness – mg/lit and ppm – Simple problems – Estimation of total hardness of water by EDTA method – Problems involving Total, Carbonate and Non-carbonate hardness in ppm – Softening of hard water – Ion-Exchange method and Reverse Osmosis method – Municipal water supply – Purification (Sedimentation, Filtration and Sterilization) – Disadvantages of using hard water in boilers – Scale formation, Corrosion of boiler metal, Caustic Embrittlement and Priming and Foaming.	**6 Hrs**
	3.2 Catalysis Catalyst – Positive catalyst – Negative catalyst – Definition – Types of catalysis – Homogeneous and Heterogeneous – Promoter – Catalyst poison – Definition – Characteristics of a catalyst – Industrial applications of catalysts.	**4 Hrs**
	3.3 Glass Definition – Manufacture of Glass – Varieties of Glass – Optical Glass, Windshield Glass and Photo chromatic Glass.	**3 Hrs**
IV	**ELECTROCHEMISTRY, ELECTROCHEMICAL CELL, ENERGY SOURCES**	
	4.1 Electrochemistry Electrolyte – Definition – Strong and Weak electrolytes – Examples – Electrolysis – Definition – Mechanism – Industrial application of Electrolysis – Electroplating – Preparation of surface – Process – Factors affecting the stability of the coating – Chrome plating – Electroless plating – Definition – Advantages of Electroless plating over electroplating – Applications of Electroless plating.	**5 Hrs**
	4.2 Electrochemical Cell Electrochemical Cell – Definition – Representation of a Cell – Single Electrode Potential – Definition – Galvanic Cell – Formation of Daniel Cell – Electrochemical Series – Definition and Significance – Electrolytic Concentration Cell – Definition and Formation.	**4 Hrs**
	4.3 Energy Sources Primary Battery – Definition and example – Construction, Working and Uses of Dry cell – Secondary Battery – Definition and example – Construction, Working and Uses of Lead-acid Storage Cell – Non-conventional Energy Sources – Solar Cell – Definition – Principle, Construction, Working and Uses.	**4 Hrs**

Unit	Name of the Topic	Hours
V	**CORRODION, METHODS OF PREVENTION OF CORROSION, ORGANIC COATINGS**	
	5.1 Corrosion	**4 Hrs**
	Definition – Types of Corrosion – Theories of corrosion – Galvanic Cell Formation Theory – Differential Aeration theory – Factors influencing the rate of corrosion.	
	5.2 Methods of Prevention of Corrosion	**4 Hrs**
	Control of Environment – Alloying – Surface coatings – Metal coatings – Electroplating, Galvanization and Tinning – Inorganic coating – Anodizing – Cathodic Protection – Sacrificial Anode Method and Impressed Voltage Method.	
	5.3 Organic Coatings	**5 Hrs**
	Paint – Definition – Components of Paints and their functions – Varnish – Definition – Preparation of Oil Varnish – Differences between Paint and Varnish – Special Paints – Luminescent Paints, Fire Retardant Paints, Aluminium Paints and Distemper.	

Text Book:

1. Engineering Chemistry – I Tamil Nadu Text Book Corporation
2. Engineering Chemistry – Jain & Jain – Dhanpat Rai & Sons.
3. A Text Book of Engineering Chemistry – S.S. Dara – S. Chand Publication.

Reference Book:

1. A Text Book of Environmental Chemistry and Pollution Control S.S. Dara – S. Chand Publication.
2. Engineering Chemistry – Uppal – Khanna Publishers.
3. Chemistry – Higher Secondary – Second Year – Volume I & II – Tamil Nadu Text Book Corporation – 2014.
4. Environmental Chemistry – V P Kudesia – Pragati Publishers.

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Board Examination - Question paper pattern

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

PART A - 5 Questions to be answered out of **8** for 2 marks each.

PART B - 5 Questions to be answered out of **8** for 3 marks each.

PART C - All the **5** Questions to be answered

Each question in PART C will contain **3** Sub questions, out of these **3** Sub questions **2** Sub questions is to be answered for 5 marks each.

PART A	**5** x 2 marks	**10** Marks
PART B Short answer type questions	**5** x 3 marks	**15** Marks
PART C Descriptive answer type questions Each question in PART C will contain **3** Sub questions, out of these **3** Sub questions **2** Sub questions is to be answered for 5 marks each.	**5 x 2** x 5 marks	**50** Marks
Total		**75** Marks

Out of the **3 Sub questions** in **PART C, one sub question** must be on problem based to test the analytical ability/logical ability /diagnostic ability/conceptual ability relevant to that subject content. Equal weightage is to be given to whole syllabus.

Clarks table will not be permitted for the Board Examinations.