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 : **30025**

Semester : II Semester

Subject Title : **ENGINEERING CHEMISTRY – II**

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 - II	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl. No	Topics	Time (Hours)
1	Environmental Chemistry	13 Hours
2	Fuels, Combustion and Refractories	13 Hours
3	Extraction of metals, Powder Metallurgy, Alloys and Abrasives	13 Hours
4	Cement, Ceramics, Lubricants and Adhesives	13 Hours
5	Polymer Chemistry	13 Hours
	Revision and Examinations	10 Hours
Total		**75 Hours**

RATIONALE:

Modern development of industries require more understanding of materials required for Engineering and industrial purposes. This part of chemistry explains various aspects with regard to environment, fuels, metals and alloys and polymers. This subject will develop basic understanding and skill of Engineering Students.

OBJECTIVES:

The objective of this Course is to make the student:

1. To acquire knowledge about Environmental Chemistry.
2. To acquire knowledge about fuels, advantages and combustion of fuels and analysis and refractories.
3. To know about extraction of metals, powder metallurgy, alloys, and abrasives.
4. To acquire knowledge about cement, ceramics, lubricants and adhesives.
5. To know about polymer materials.

30025 ENGINEERING CHEMISTRY – II

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**ENVIRONMENTAL CHEMISTRY**	
	1.1 Air Pollution	**5 Hrs**
	Pollution and Air pollution – Definition – Air pollutants (SO_2, H_2S, HF, CO and Dust) – Sources and Harmful effects – Formation of Acid Rain – Harmful effects – Green House Effect – Causes – Global warming – Harmful effects – Ozone Layer – Importance – Causes for Depletion of Ozone Layer (No equations) – Harmful effects of Ozone Layer Depletion – Control of Air Pollution.	
	1.2 Water Pollution	**4 Hrs**
	Causes of Water Pollution – Sewage, Effluents, Algae and Microorganisms – Harmful effects –Sewerage – Definition – Sewage Disposal – Industrial Effluents – Harmful effects of Effluents – Harmful effects of Heavy Metal Ions – Lead, Cadmium, Zinc and Copper – Treatment of Effluents – Eutrophication – Definition and harmful effects.	
	1.3 Solid Waste Management	**2 Hrs**
	Solid Waste – Definition – Problems – Types of Solid Waste – Methods of disposal – Land fill and Incineration.	**2 Hrs**
	1.4 Green Chemistry	
	Definition – Goals of Green Chemistry (Basic ideas) – Recycling – Definition – Examples – Advantages of Recycling (Basic ideas)	
II	**FUELS, COMBUSTION AND REFRACTORIES**	
	2.1 Fuels	**6 Hrs**
	Fuel and fossil fuel – Definition – Calorific value – Classification of fuels – Solid fuels – Wood – Coal – Varieties of Coal – Composition – Specific uses – Liquid fuels – Petroleum – Fractional distillation – Fractions and uses – Cracking (Concept only) – Liquid Hydrogen as fuel – Gaseous fuels – Preparation, composition and specific uses of Producer gas and Water gas – Composition and uses of CNG and LPG – Relative advantages of solid, liquid and gaseous fuels.	
	2.2 Combustion	**5 Hrs**
	Definition – Combustion calculation by mass (for solid and liquid fuels) – Combustion calculation by volume (for gaseous fuels) – Stoichiometric calculations – Volume of air required – Excess air – Definition of Flue gas – Flue gas Analysis – Orsat Apparatus – Simple numerical problems.	
	2.3 Refractories	
	Definition – Requirements of a good Refractory – Classification – Acidic, Basic and Neutral Refractories – Examples and uses – Uses of Fireclay bricks, Alumina bricks and Silica bricks.	**2 Hrs**

Unit	Name of the Topic	Hours
III	**EXTRACTION OF METALS, POWDER METALLURGY, ALLOYS AND ABRASIVES**	
	3.1 Extraction of metals	**2 Hrs**
	Extraction of Tungsten and Titanium – Uses of Tungsten and Titanium.	
	3.2 Powder metallurgy	**3 Hrs**
	Definition – Preparation of Metal Powder – Atomization – Reduction of Metal Oxide – Applications of Powder Metallurgy.	
	3.3 Alloys	**4 Hrs**
	Definition – Purpose of alloying – Types – Ferrous Alloys – Composition and uses of Stainless Steel, Chromium Steel and Vanadium Steel – Non-ferrous alloys – Composition and uses of Nichrome, Dutch metal, German silver, Gun metal and Duralumin.	
	3.4 Abrasives	**4 Hrs**
	Definition – Classification – Hardness in Moh's scale – Natural abrasives – Diamond, Corundum, Emery and Garnet – Synthetic abrasives – Carborundum – Boron carbide – Manufacture – Properties and uses.	
IV	**CEMENT, CERAMICS, LUBRICANTS AND ADHESIVES**	
	4.1 Cement	**3 Hrs**
	Definition – Manufacture of Portland Cement – Wet Process – Setting of Cement (No equation).	
	4.2 Ceramics	**3 Hrs**
	White pottery – Definition – Manufacture of White pottery – Uses – Definition of glazing – Purpose – Method – Salt glazing.	
	4.3 Lubricants	**3 Hrs**
	Definition – Characteristics of Lubricant – Types of Lubricants – Solid – Semi-solid –Liquid Lubricants .	
	4.4 Adhesives	**4 Hrs**
	Definition – Requirements of good adhesives – Natural adhesive – Uses of Shellac, Starch, Asphalt – Synthetic adhesive – Uses of Cellulose Nitrate, PVC, Phenol-formaldehyde and Urea-formaldehyde.	

Unit	Name of the Topic	Hours
V	**POLYMERS** **5.1 Plastics** Plastics – Definition - Polymerization – Definition – Types of polymerization – Addition polymerization – Formation of Polythene – Condensation polymerization – Formation of Bakelite – Types of plastics – Thermoplastics and Thermoset plastics – Differences – Mechanical properties of plastics – Advantages of plastics over traditional materials (Wood and Metal) –Reinforced or filled plastics – Definition – Advantages – Applications – Polymers in Surgery – Biomaterials – Definition – Biomedical uses of Polyurethane, PVC, Polypropylene and Polyethylene. **5.2 Rubber** Definition – Preparation from Latex – Defects of natural rubber– Compounding of rubber – Ingredients and their functions – Vulcanization – Definition and Purpose – Reclaimed rubber – Definition – Process – Properties and uses. **5.3 Composite materials** Definition – Examples – Advantages over metals and polymers – General applications.	**6 Hrs** **5 Hrs** **2 Hrs**

Text Book:

1. Engineering Chemistry – Jain & Jain – Dhanpat Rai & Sons.
2. A Text Book of Engineering Chemistry – S.S. Dara – S. Chand Publication.

Reference Book:

1. Chemistry of Engineering Material-C.V. Agarwal, Andranaidu C. Parameswara Moorthy – B.S. Publications.
2. Engineering Chemistry – Uppal – Khanna Publishers.
3. A Text Book of Inorganic Chemistry – P.L. Soni – S. Chand Publication.
4. Rain Water Harvesting – Hand Book – Chennai Metro Water.

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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.