

# ENGINEERING CHEMISTRY

<b>Subject Code</b> <b>00103</b>	<b>Theory</b>			<b>No of Period in one session : 50</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>04</b>	<b>—</b>	<b>—</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

## Rationale & Objective:

Keeping in view the recent developments in Science and the present needs in Industries, the curriculum of Engineering Chemistry has been revised so that the Engineers or Technicians may have a better knowledge of Chemistry, especially regarding the application of the subject in various fields of Industries. An emphasis, in this direction, has been made in the curriculum.

A new chapter on Environmental Chemistry has been introduced to make the students acquainted with the various pollution hazards which is becoming more critical everyday.

The following topics are so chosen that through their contents the students are able to develop knowledge, skill and scientific attitude. It will enable them to distinguish, differentiate, analyse and solve engineering problems.

S.No.	Topics	Periods
<b>GROUP - A</b>		
1.	Importance of Chemistry for Engineers and its applications in industries	(02)
2.	General Chemistry	(05)
3.	Atomic Structure	(03)
4.	Chemical Bonding	(03)
5.	Chemical Equilibrium	(03)
6.	Metallurgical Operations	(08)
1.	Water Treatment	(08)
2.	Fuel & Combustion	(08)
3.	Lubricants	(02)
4.	Paints and Varnishes	(02)
5.	Environmental Chemistry	(06)

## CONTENTS:

### GROUP - A

<b>Topic: 01 - Introduction</b>		<b>[02]</b>
01.01	Importance of Chemistry for Engineers and its application in industries.	
<b>Topic: 02 - General Chemistry</b>		<b>[05]</b>
02.01	Atomic Wt. Equivalent Wt., Molecular Wt. and their determination, Numerical Problems.	
02.02	Mole Concept, Avogadro's number, Numerical Problems.	
<b>Topic: 03 - Atomic Structure</b>		<b>[03]</b>
03.01	Basic idea of fundamental particles, Atomic Number, Mass Number, Rutherford model & Bohr's model.	
03.02	Electronic configuration in s, p, d, f notation.	
<b>Topic: 04 - Chemical Bonding</b>		<b>[03]</b>
04.01	Ionization Potential, Electron affinity, electronegativity.	
04.02	Types of Chemical Bonds - Electrovalent, Covalent (Polar and non-polar) and Co-ordinate bonds.	
<b>Topic: 05 - Chemical Equilibrium</b>		<b>[03]</b>
05.01	Reversible and Irreversible reaction, Chemical Equilibrium.	
05.02	Law of mass action.	
05.03	Ionic product of water, PH-scale, Common Ion Effect and Numerical problems.	
<b>Topic: 06 - Metallurgical Operations</b>		<b>[08]</b>
06.01	General metallurgical operations, Concentration of metal ore, Roasting, Calcination, Smelting, refining of metals.	
06.02	Extraction of Iron, Aluminium and Copper.	
06.03	Manufacture of steel - (a) Bessemer process, (b) Open Hearth process, effect of impurities such as Mn, P, S and Si. Heat treatment of steel, Annealing, Hardening, Tempering, Normalising, Case hardening, Nitriding and Cyaniding	
06.04	Introduction, Importance, Classification and uses of alloys with examples.	

### GROUP - B

<b>Topic: 07 - Water Treatment</b>		<b>[08]</b>
07.01	Introduction - Use of water for Industrial and domestic purposes, sources of water supply.	
07.02	Hardness of water, degree of hardness and its estimation (Hehner and EDTA methods). Numerical problems on degree of hardness. PH-value of water, disinfection of water and Municipal Supply.	
07.03	Softening of hard water (Lime-Soda method, Permutit, Ion Exchange and calgon methods).	
<b>Topic: 08 - Fuel and Combustion</b>		<b>[08]</b>
08.01	Introduction - Importance of fuels in Industries, classification of fuels, calorific values, Determination of calorific value and Numerical problems. Characteristics of an ideal fuel.	

08.02	Refining and cracking of petroleum, knocking. Octane Number and Cetane Number. Merits and demerits of fuels, L.P.G., Coal gas, Oil gas and Producer gas.	
	<b>Topic: 09 - Lubricants</b>	[02]
10.01	Introduction & Classification of lubricants.	
10.02	Properties of lubricants, Lubricants Oil, grease, emulsions.	
	<b>Topic: 10 - Paints and Varnishes</b>	[02]
11.01	Characteristics of a good paint, brief study of various constituents of a paint.	
	<b>Topic: 11 - Environmental Chemistry</b>	[06]
13.01	Introduction:	
13.01.01	Effect of pollution on human health (Name of diseases) and plant.	
13.02	Air Pollution:	
13.02.01	Causes of air pollution like factory Smoke discharge, Automobile exhaust gas, Deforestation etc.	
13.02.02	Brief idea of pollution effects like Acid rain, Green house effect, Action of Ozone layer which causes green house effect on earth, effect of chlorofluorocarbon on depletion of ozone layer.	
13.03	Water Pollution:	
13.03.01	Standard prescribed by WHO, IMC and Bureau of Indian Standard for pure drinking water.	

**Books Recommended:**

1	Text Book of Engineering Chemistry	- M.M. Uppal
2	Text Book of Engineering Chemistry	- C.V. Agrawal
3	Text Book of Engineering Chemistry	- P.C. Jain
4	Pradyogiki Rasayan (Hindi)	- S.Z. Aahmad & Prof. Subuktgin
5	Takniki Rasayan Bhag 1 evam 2 (Hindi)	- Roop Prakashan
6	a. Inorganic Chemistry	- P.L. Soni
	b. Physical Chemistry	- P.L. Soni
7	a. Inorganic Chemistry	- Biltu Singh
	b. Physical Chemistry	- Biltu Singh
8	a. Inorganic Chemistry	- Ram Ratan Pd.
9	Environmental Chemistry	-