

1006 - APPLIED CHEMISTRY R1										
Teaching Schedule Per Week ¹			Progressive Assessment		Examination Schedule (Marks)					
Lectures	Practical	Credits			Theory		Practical Ex.	Total		
3	2	5	25	25	3Hrs.	100	50	200		
Pre-requisite		Source	US Semester	Theory	Test	Total	TW	PR	Gr Total	
NIL		MSH		75	25	100	25	50	175	

RATIONALE: - Applied Chemistry is multi-disciplinary science having wide applications in all the branches of engineering. In simpler terms, it is the science of chemical phenomena in various engineering situations. In broader terms, it is the study of the sources, reactions etc. in various engineering processes. An understanding of the basic concepts of applied chemistry is essential not only for all chemists but also for engineers. Chemistry therefore forms an indispensable base for all engineers. The emphasis is given on applications of principles of chemistry to engineering situations rather than fundamental principles. The coverage of various topics will orient students to appreciate the use of chemistry to engineering applications.

COURSE CONTENTS		Hrs	Mks
1. ATOMIC STRUCTURE		10	20
Quantum Numbers: Definition. Brief description of:- a) Principal quantum number b) Azimuthal quantum number c) Magnetic quantum number d) spin quantum number			
Sub-energy levels: definition and designation of sub-energy levels, number of electrons in each sub-energy level, orbital electronic configuration of the atoms with atomic number 01 to 20, Hund's rule, Pauli's exclusion Principle & Aufbau Principle expected, Electronic theory of valency: Lewis and langmuir concept of stable configuration, Valency: definition, valence electrons and chemical behaviour of elements, types of valency: a) Electro-valency, b) Co-valency, c) Co-ordinate valency, formation, properties & examples of: a) Electrovalent compounds: (NaCl; MgO; CaCl ₂) (b) Co-valent compounds: (Cl ₂ ; O ₂ ; N ₂ ; CO ₂) (c) Co-ordinate compounds: (SO ₂ ; O ₃).			
2. ELECTROCHEMISTRY		08	20
Arrhenius theory of electrolytic dissociation, electrolysis: conductivity of electrolytes: a) specific conductivity, equivalent conductivity, cell constant, variation of equivalent conductance with dilution, variation of specific conductance with dilution, electrochemical series & its significance, mechanism of electrolysis, examples of electrolysis, electrolysis of: a) sodium chloride solution by using platinum electrodes, fused sodium chloride by using carbon electrodes, copper sulphate solution by using platinum electrodes, copper sulphate solution by using copper electrodes.			
3. WATER		10	14
Soft and hard water: definitions, causes of hardness of water, types of hardness, treatment for removal of hardness: permut process, ion exchange process, desalination of brackish water, definitions, Electrodialysis: process & advantages, reverse Osmosis: Process: process & advantages, pH value: definition & concept of pH.			
4. CORROSION		16	36
Definition, dry or chemical corrosion, definition, oxidation corrosion, mechanism of oxidation corrosion, nature of the oxide film formed, corrosion by other gases, wet or electrochemical corrosion, mechanism of wet or electrochemical corrosion: Evolution of hydrogen, Absorption of oxygen, Galvanic corrosion, concentration cell corrosion, corrosion control, proper designing, using pure metal, using metal			

alloys, cathodic protection, sacrificial anodic protection, impressed current cathodic protection, modifying environment: i) Deaeration ii) deactivation iii) dehumidification, alkaline neutralisation, galvanising, tinning, metal spraying.

5. ADHESIVES

Definition, advantages of adhesives, limitations of adhesive bonding, adhesive action, physical factors influencing adhesive action, chemical factors influencing adhesive action.

04 10

Total

48 100

PRACTICALS

1. Double titration of acid and base using phenolphthalein.
2. Double titration of acid and base using methyl orange.
3. Redox titration of potassium permanganate, ferrous sulphate and oxalic acid.
4. Determination of degree of hardness of water by EDTA method.
5. Determination of chloride content of water by Mohr's method.
6. Determination of total alkalinity of water sample.
7. Titration of strong acid and strong base using pH meter.
8. Determination of conductivity of water.
9. Titration of strong acid and strong base using conductometer.
10. Corrosion susceptibility of aluminium to acid or base.

NOTE: Practical examination will be based on experiment no 1,2 and any five from no. 4 to 10.

REFERENCE BOOKS

- A Text book of Engineering Chemistry, by M.M Uppal (Khanna publishers)
 A Text book of Engineering Chemistry, by V.P. Mehta (Jain Bros. Delhi)
 A Text book of Engineering Chemistry, by S.N. Narkhede (Nirali Prakashan)
 Text book of Applied Chemistry, by R.A. Banawat, S.K. Mahajan, S.K. Mehta (India Book House)
 Text book of Engineering Chemistry, by R.S Sharma, Khanna Publishers
 Applied Chemistry, by B. S. Godbole (Satya Prakashan).
 Engineering Chemistry, by P. C. Jain & M. Jain (Dhanpat Rai Publishing Company, New Delhi)