Course Number and Name

BCH101 - ENGINEERING CHEMISTRY I

Credits and Contact Hours

3 & 45

Course Coordinator's Name

Ms Madhubala

Text Books and References

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2002).
2. S.S. Dara "A text book of engineering chemistry" S.Chand & Co.Ltd., New Delhi (2006).
3. P. J. Lucia, M. Subhashini, "Engineering Chemistry, Volume 1", Crystal Publications, Chennai, (2007).

REFERENCES:

1. B.K.Sharma "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008)

Course Description

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

Prerequisites	Co-requisites
+2 level Chemistry	Nil

required, elective, or selected elective (as per Table 5-1)

Required

Course Outcomes (COs)

CO1 :Understand the principles of water characterization and treatment for portable and industrial purposes.

CO2 :To impart knowledge on the essential aspects of Principles of polymer chemistry and engineering applications of polymers

CO3 :Having a sound knowledge in the Field of the Conventional and non-Conventional energy

CO4:To impart knowledge on the essential aspects of electrochemical cells, emf and applications of emf measurements

CO5 :To make the students understand the Principles of corrosion and corrosion control.

CO6 :To impart knowledge about the Conventional and non-conventional energy sources and energy storage devices

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	H						H				
CO2		L	H		M						
CO3		M		H							
CO4	H		M	L			H				
CO5		L	L								
CO6	H						H				

List of Topics Covered

UNIT I Water Technology **9**

Introduction-Characteristics : Hardness of water – types - temporary and permanent hardness - estimation by EDTA method Alkalinity – types of alkalinity - Phenolphthalein and Methyl orange alkalinity - determination –Domestic water treatment – disinfection methods (Chlorination, ozonation , UV treatment) Boiler feed water – requirements – disadvantages of using hard water in boilers Internal conditioning (Calgon Conditioning method) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II Polymers **9**

Introduction-Polymers- definition – polymerization – degree of polymerisation - types of polymerisation – Addition polymerization and Condensation polymerization – Mechanism of Polymerisation - free radical polymerization mechanism only, Plastics: Classification – thermoplastics and thermosetting plastics – difference between thermoplastics and thermosetting plastics - preparation, properties and uses of PVC, Teflon, nylon-6,6, PET, Rubber :Types – drawbacks of natural rubber -vulcanization of rubber - properties and uses of vulcanized rubber Synthetic rubbers – butyl rubber and SBR

UNIT III Electrochemistry **9**

Introduction CELLS : Types of Cells : Electrochemical cells , Electrolytic cells – Reversible and Irreversible cells EMF – measurement of emf – Single electrode potential – Nernst equation Reference electrodes : Standard Hydrogen electrode -Calomel electrode Ion selective electrode :Glass electrode and measurement of pH using Glass electrode Electrochemical series – significance Titrations :Potentiometer titrations (redox - Fe^{2+} vs dichromate titrations) Conductometric titrations (acid-base – HCI vs, NaOH titrations)

UNIT IV Corrosion and Corrosion Control **9**

Introduction: Chemical corrosion Definition - Chemical Corrosion - Electrochemical corrosion – different types – galvanic corrosion –differential aeration corrosion – mechanism of Chemical and Electrochemical corrosion factors influencing corrosion Corrosion control – sacrificial anode and impressed cathodic current methods – Protective coatings :Paints – constituents of the paint and their functions Metallic coatings – electroplating of Gold and electroless plating of Nickel.

UNIT V Non-Conventional Energy Sources and Storage Devices **9**

Introduction : Nuclear fission and nuclear fusion reactions – differences between nuclear fission and nuclear fusion reactions – nuclear chain Reactions – nuclear energy critical mass - super critical mass - sub - critical mass Light water nuclear reactor for power generation (block diagram only) – breeder reactor Solar energy conversion – solar cells – wind energy Fuel cells – hydrogen – oxygen fuel cell Batteries :Primary and secondary Batteries – differences between Primary and secondary Batteries Secondary batteries: Lead–acid storage battery –working – uses Nickel–cadmium battery - working –uses Solid – state battery : Lithium battery.