



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
BS23	Applied Chemistry - II	2	0	0	2	0	0	2
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Course Objective:

- To provide necessary background of applied chemistry suited for relevant areas of engineering

Pre-requisite Course Codes	HSC Level Chemistry	
After successful completion of the course, student will be able to		
Course Outcomes	CO1	Identify methods for corrosion control based on knowledge of different types of corrosion and factors affecting rate of corrosion
	CO2	Illustrate mechanism of combustion of fuels based on knowledge of their composition and properties
	CO3	Describe principle, construction and working of different types of batteries and fuel cells for varied applications
	CO4	Illustrate composition, properties and applications of different alloys
	CO5	Apply the principles of green chemistry to various industrial processes to minimize adverse impact on public health and environment
	CO6	Illustrate the properties and applications of different composite materials.

Module No	Module Name	Unit No.	Topics	Ref.	Hrs.
1	Corrosion	1.1	Introduction, Dry or Chemical Corrosion i) Due to oxygen ii) Due to other gases	1,2,4	1
		1.2	Wet or Electrochemical corrosion- Mechanism i) Evolution of hydrogen type ii) Absorption of oxygen	1,2	1
		1.3	Types of Electrochemical Corrosion- Galvanic cell corrosion, differential aeration and its various forms	1,2	1



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1	Corrosion	1.4	Factors affecting the rate of corrosion- i) Position of metal in galvanic series, ii) overvoltage, iii) relative area of anodic and cathodic parts, v) purity of metal, nature of the corrosion product, vi) temperature, vii) moisture, viii) influence of pH, and ix) conductance of the medium	1,2	1
		1.5	Methods to decrease the rate of corrosion- Material selection, Proper designing, Cathodic protection- i) Sacrificial anodic protection ii) Impressed current method, Metallic coatings, Cathodic and anodic coatings; Methods of application of coatings - i) hot dipping, (galvanizing, and tinning), ii) metal cladding, and iii) Electroplating	1,2,4	2
2	Fuels	2.1	Definition, classification of fuels, Characteristics of a good fuel, Calorific value- Definition, Gross or Higher calorific value & Net or lower calorific value, units of heat, (only cal/g or kcal/kg),	1,2	1
		2.2	Dulong's formula & numerical for calculations of Gross and Net calorific values.	1	1
		2.3	Solid fuels- Analysis of coal- Proximate and Ultimate Analysis with Significance and numerical.	1,2	1
		2.4	Liquid fuels- Brief description of Fractional Distillation with diagram and fractions,	1,2	1
		2.5	Knocking, Octane number, Cetane number Antiknocking agents, Catalytic converter, unleaded petrol (use of MTBE),	1,2	1
		2.6	Combustion- Calculations for requirement of only oxygen and air (by weight and by volume only) for given solid & gaseous fuels.	1,2	2
3	Batteries and Battery Technology	3.1	Introduction, electrochemical principles used in batteries,	2	1
		3.2	Primary cells, Secondary Batteries, (Nickel-Cadmium, Nickel-Hydrogen, Nickel-Metal Hydride, Rechargeable Lithium ion batteries)	2	2
		3.3	Reserve Batteries, Fuel cell.	2	1



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Module No	Module Name	Unit No	Topics	Ref No	Hours
4	Alloys	4.1	Introduction, Ferrous alloys, plain carbon steels, Limitations of plain carbon steels, Alloy Steels	1	1
		4.2	Application of alloy steels: heat resistant and corrosion resistant steels (only nichrome and stainless steel)	1	1
		4.3	Non-Ferrous alloys- Composition, properties and uses of- Alloys of Aluminum- i) Duralumin Alloys of Copper- (I) Brasses-i) Commercial brass ii) German silver, (II) Bronzes- i) Gun metal ii) High phosphorous bronze. Alloys of Pb - i) Wood's metal ii) Tinmann's solder. Shape Memory Alloys: Definition, Properties and Applications.	1	1
5	Green Chemistry	5.1	Introduction, Twelve Principles of Green Chemistry, Numericals on Atom Economy	2	1
		5.2	Industrial Applications: Synthesis of Adipic Acid, Green Solvents (Water, Ionic Liquids, Supercritical Fluids), Green Fuels	2	2
6	Composite Materials	5.1	Composite: Introduction, Characteristic properties and applications of composite materials. Constitution- i) Matrix phase ii) Dispersed phase	1,2,3,4	1
		5.2	Classification of composites, Fiber reinforced Plastics, Structural -composites- i) Laminates (ii) Sandwich Panels,	1,2	1
		5.3	Cermets, Ceramics, Preparation and uses of Alumina and Silicon Carbide.	1,2,3,4	1
Total					26hrs

References:

- [1] P. C. Jain & M. Jain, *Engineering Chemistry*, 16th ed , New Delhi, India: Dhanpat Rai Publishing Co. (P) Ltd., 2014
- [2] S. S. Dara & S. S. Umare, *A Textbook of Engineering Chemistry*, 12th ed. , New Delhi, India: S. Chand & Co. Ltd., 2013
- [3] S. Chawla, *A Textbook of Engineering Chemistry*, 3rd ed., Delhi, India: Dhanpat Rai & Co. (Pvt.) Ltd., 2015
- [4] S. Agarwal, *Engineering Chemistry Fundamentals and Applications*, 1st ed , Delhi, India: Cambridge Univ. Press., 2015