Faculty of Science
Bachelor of Science
(W. E. F.: 2023-24)
Document ID: SUTEFSCB-01

Name of Faculty	:	Faculty of Science
Name of Program	:	Bachelor of Science
Course Code	:	1BSC03
Course Title	:	Applied Chemistry
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	Interest in learning of applied chemistry as well as practical skill instudent.
Course Objective	:	To provide necessary background in applied chemistry relevant tochemical industries. To provide exposure in conducting experiment and interpret and report the results in professional format.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Apply the knowledge of types of hardness of water and its estimation.
	CO2	Remember the knowledge of various softening and disinfecting methods.
	CO3	Understand the knowledge of various polymers, their synthesis, properties and uses along with their fabricationtechniques.
	CO4	Apply the knowledge of lubricants, types, properties and mechanisms to avoid frictional resistance.
	CO5	Demonstrate the knowledge of Portland cement and carbon nanomaterials.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
3	0	2	4	50	25	50	25	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping With COs
1	**Water** Impurities in water, Hardness of water, Determination of Hardness of water by EDTA method and problems, Softening of water by Hot and Cold lime Soda method and numerical problems. Zeolite process and numerical problems. Ion Exchange process and numerical problems. Potable water standard as per BIS w.r.t. i) pH, ii) Alkalinity, iii) TDS, iv) Hardness; Drinking water or Municipal water - Treatments removal of microorganisms by adding Bleaching powder, Chlorination (no breakpoint chlorination), Disinfection by Ozone, Electrodialysis, Reverse osmosis, and Ultra filtration. BOD, COD- definition & significance, sewage treatment (only activated sludge process), Numerical problems related to COD.	12	26.66%	CO1 CO2
2	**Polymers** Introduction to polymers, Classification, Types of polymerization, Thermoplastic and Thermosetting plastic; Compounding of plastic, Fabrication of plastic by Compression, Injection, Transfer and Extrusion moulding. Preparation, properties and uses of Phenol formaldehyde, PMMA, Kevlar. Effect of heat on the polymers (Glass transition temperature), Viscoelasticity. Conducting polymers, Engineering Plastics, Polymers in medicine and surgery. Rubbers :Natural rubber- latex, Drawbacks of natural rubber, Vulcanization of rubber, Preparation, properties and uses of Buna-S, Silicone and Polyurethane rubber.	10	22.22%	CO3
3	**Lubricants** Introduction, Definition, Mechanism of lubrication, Classification of lubricants, Solid lubricants (graphite & Molybdenum disulphide), Semisolid lubricants, Liquid lubricants, Additives in blended Oils. Important properties of lubricants Definition and significance of Viscosity,	11	24.44%	CO4

	Viscosity index, Flash and fire points, Cloud and pour points, Oiliness, Emulsification, Acid value and numerical problems, Saponification value and numerical problems.			
4	**Important Engineering Materials** Cement – Manufacture of Portland Cement, Chemical Composition and Constitution of Portland Cement, Setting and Hardening of Portland Cement, Concrete, RCC and Decay. Nanomaterials, preparation (Laser and CVD) method, properties and uses of CNTS, Fullerene - properties and uses.	12	26.66%	CO5

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**20**	**20**	**40**	**20**	**-**	**-**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments / Tutorials

Sr. No.	**Name of Experiment / Tutorial**	**Teaching Hours**
1	To determine total, temporary and permanent hardness of water sample.	02
2	Removal of hardness using ion exchange column.	02
3	To determine free acid pH of different solutions using pHmeter	02
4	To determine metal ion concentration using colorimeter.	02
5	To determine flash point and fire point of a lubricating oil	02
6	To determine Chloride content of water by Mohr's Method.	02
7	To determine melting point and /or glass transition temperature of a polymer	02
8	Molecular weight determination of polymers by Oswald Viscometer.	02
9	To determine the percentage of lime in cement.	02
10	Hardening and setting of cement using Vicat's apparatus	02
11	Determination of Viscosity of oil by Redwood Viscometer.	02

Major Equipment /Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	PH Meter
2	Glass Column
3	Colorimeter
4	Oswald Viscometer
5	Redwood Viscometer
6	Flash Point & Fire Point Apparatus
7	Vicat's apparatus

Suggested Learning Websites

Sr. No.	Name of Website
1	http://nptel.ac.in/courses/104106119

Reference Books

Sr. No.	Name of Reference Books
1	Engineering Chemistry – Jain & Jain (Dhanpat Rai)
2	Engineering Chemistry – Dara & Dara (S Chand)
3	Engineering Chemistry - Wiley India (ISBN – 9788126519880)
4	A Text Book of Engineering Chemistry – Shashi Chawla (DhanpatRai)