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Estd.2001

Sri Indu

College of Engineering & Technology

UGC Autonomous Institution

Recognized under 2(f) & 12(B) of UGC Act 1956,
NAAC, Approved by AICTE &
Permanently Affiliated to JNTUH

NAAC
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL

HANDOUT

I Year I Semester

DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

SUBJECT: ENGINEERING CHEMISTRY

ACADEMIC YEAR 2022-23

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

HANDOUT- INDEX

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, Affiliated to JNTUH)
Sheriguda (V), Ibrahimpatnam (M), R.R. Dist-501510

DEPARTMENTOF COMPUTER SCIENCE ENGINEERING

VISION OF THE INSTITUTE

To be a premier Institution in Engineering & Technology and Management with competency, values and social consciousness

MISSION OF THE INSTITUTE

IM1: Provide high quality academic programs, training activities and research facilities.

IM2: Promote Continuous Industry-Institute interaction for employability, Entrepreneurship, leadership and research aptitude among stakeholders.

IM3: Contribute to the economical and technological development of the region, State and Nation.

VISION OF THE DEPARTMENT

To be a technologically adaptive centre for computing by grooming the students as top notch professionals

MISSION OF THE DEPARTMENT

DM1: To offer quality education in computing.

DM2: To provide an environment that enables overall development of all the stakeholders.

DM3: To impart training on emerging technologies like Data Analytics, Artificial Intelligence and Internet of Things.

DM4: To encourage participation of stakeholders in research and development.

PROGRAM EDUCATIONAL OBJECTIVES(PEO'S)

PEO1	**Higher Studies:** Graduates with an ability to apply knowledge of Basic Sciences and programming skills in their career and higher education.
PE02	**Domain Knowledge**: Graduate with an ability to design and develop a product.
PEO3	**Professional Skills :** Graduates will be ready to work in projects related to complex problems involving multidisciplinary projects with effective analytical skills
PEO4	**Lifelong Learning:** Graduates with an ability to adopt new technologies for ever changing IT industry needs through Self-Study, Critical thinking and Problem solving skills.

PROGRAM SPECIFIC OUT COMES(PSO'S)

Program Specific Outcomes	
PSO 1	To develop software projects using standard practices and suitable programming environment.
PSO 2	To identify, formulate and solve the real life problems faced in the society, industry and other areas by applying the skills of the programming languages, networks and databases learned.
PSO 3	To apply computer science knowledge in exploring and adopting latest technologies in various inter-disciplinary research activities.

PROGRAM OUTCOMES (PO'S)

PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design / Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE OUTCOMES (CO's)

Academic Year: 2022-23

Class: I YEAR-I SEM**.**

Course Name: ENGINEERING CHEMISTRY (R22CHE1112)

At the end of the course, the student will be able to

Course Outcomes (COs)	
C112.1	Acquire the basic knowledge of electro chemical procedures related to corrosion and its control.
C112.2	Understand the basic properties of water and its usage in domestic and industrial purposes.
C112.3	Learn the fundamentals and general properties of polymers and other engineering materials.
C112.4	Predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.
C112.5	Understand the synthesis of Synthetic petrol.

Mapping of Course Outcomes(CO's) with PO's:

CO	PO"S												PSO"S		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
C112.1	3	3	2	-	-	-	**2**	-	-	-	-	2	1	1	-
C112.2	3	3	3	-	-	-	3	-	-	-	-	2	1	2	-
C112.3	3	2	2	-	-	-	3	-	-	-	-	2	2	-	-
C112.4	3	3	2	-	-	-	2	-	-	-	-	2	1	1	-
C112.5	3	2	2	-	-	-	1	-	-	-	-	1	1	1	-
C112	**3**	**2.6**	**2.2**	**-**	**-**	**-**	**2.2**	**-**	**-**	**-**	**-**	**1.8**	**1.2**	**1**	**-**

3: High **2. Medium** **1. Low**

Faculty signature

ACADEMIC CALENDAR 2022-2023

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)
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NBA Accredited, Approved by AICTE and Permanently affiliated to JNTUH
Sheriguda (V), Ibrahimpatnam, R.R.Dist, Hyderabad - 501 510

D4

BR-22

Lr.No.SICET/AUTO/DAE/BR-22/Academic Cal./655/2022 Date: 27.10.2022

I B.TECH. ACADEMIC CALENDAR
ACADEMIC YEAR : 2022-2023

Dr.G. SURESH,
Principal,

To,
All the HODs
Sir,

Sub: SICET (Autonomous) - Academic & Evaluation - Academic Calendar for **I B.Tech - I & II Semester** for the academic year **2022-23** – Reg.

****

The approved Academic Calendar for **I B.Tech – I & II Semester** for the academic year **2022-23** is given below:

I SEMESTER

S.NO.	EVENT	PERIOD	DURATION
1.	Induction & Orientation Programme	**03.11.2022**	
2.	1ST Spell of Instructions for covering First Two and a half Units	03.11.2022 – 28.12.2022	8 Weeks
3.	I Mid Examinations	29.12.2022 – 04.01.2023	1 Week
4.	Submission of I Mid Term Examination Marks to the Autonomous Section on or before	10.01.2023	
5.	2nd Spell of Instructions for covering Remaining Two and a half Units	05.01.2023 – 02.03.2023	8 Weeks
6.	II Mid Examinations	03.03.2023 – 09.03.2023	1 Week
7.	Preparation & Practical Examinations and Remidial Mid Test (RMT)	10.03.2023 – 16.03.2023	1 Week
8.	Submission of II Mid Term Examination Marks Marks to the Autonomous Section on or before	16.03.2023	
9.	I Semester End Examinations	17.03.2023 – 01.04.2023	2 Weeks
	Commencement of Class-Work for I B.Tech - II Semester 03.04.2023		

II SEMESTER

S.NO.	EVENT	PERIOD	DURATION
1.	Commencement of II Sem Class Work	**03.04.2023**	
2.	1st Spell of Instructions for covering First Two and a half Units (Including Summer Vacation)	03.04.2023 – 10.06.2023	10 Weeks
	Summer Vacation	15.05.2023 – 27.05.2023	2 Weeks
3.	I Mid Examinations	12.06.2023 – 17.06.2023	1 Week
4.	Submission of I Mid Term Examination Marks to the Autonomous Section on or before	23.06.2023	
5.	2nd Spell of Instructions for covering Remaining Two and a half Units	19.06.2023 – 12.08.2023	8 Weeks
6.	II Mid Examinations	14.08.2023 – 19.08.2023	1 Week
7.	Preparation & Practical Examinations and Remidial Mid Test (RMT)	21.08.2023 – 26.08.2023	1 Week
8.	Submission of II Mid Term Examination Marks Marks to the Autonomous Section on or before	26.08.2023	
9.	II Semester End Examinations	28.08.2023 – 09.09.2023	2 Weeks
	Commencement of Class Work for II B.Tech – I Semester - 11.09.2023		

ACE **CE** **DEAN** **PRINCIPAL**

Copy to all the Heads of the Depts. and AO.

CONTROLLER OF EXAMINATIONS
Sri Indu College of Engineering & Technology
(An Autonomous Institution under JNTUH)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510.

DIRECTOR
(Academic Audit)
Sri Indu College of Engineering & Technology
Sheriguda, IBP, R.R. Dist-501510.

PRINCIPAL
Sri Indu College of Engineering & Technology
(An Autonomous Institution Under JNTUH)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510.

SRI INDU COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF HUMANITIES & SCIENCES

DEPARTMENT CALENDAR – 2022-2023 (I B.Tech – I SEMESTER)

															APRIL - 23	
DAYS					JANUARY -23										1	I SEMESTER END EXAMINATIONS
SUNDAY					1	NEW YEAR/ HOLIDAY									2	HOLIDAY
MONDAY	NOVEMBER -22				2	MID I EXAM									3	COMMENCEMENT OF II SEMESTER CLASSES- I MID
TUESDAY	1				3	MID I EXAM	FEBRUARY - 23		MARCH - 23						4	
WEDNESDAY	2		DECEMBER - 22		4	MID I EXAM	1		1						5	
THURSDAY	3	INDUCTION & ORIENTATION PROGRAM I SEMESTER CLASSES- I MID	1		5	I SEMESTER CLASSES- II MID	2		2						6	
FRIDAY	4		2		6		3		3	MID II EXAM					7	
SATURDAY	5		3		7		4		4	MID II EXAM					8	
SUNDAY	6	HOLIDAY	4	HOLIDAY	8	HOLIDAY	5	HOLIDAY	5	HOLIDAY					9	HOLIDAY
MONDAY	7	INDUCTION & ORIENTATION PROGRAM I SEMESTER CLASSES- I MID	5		9		6		6	MID II EXAM					10	
TUESDAY	8		6		10		7		7	MID II EXAM					11	
WEDNESDAY	9		7		11		8		8	HOLI					12	
THURSDAY	10		8		12		9		9	MID II EXAM					13	
FRIDAY	11		9		13	PONGAL / HOLIDAY	10		10	PREPARATION & LAB END EXAMINATIONS					14	
SATURDAY	12		10		14	PONGAL / HOLIDAY	11		11						15	
SUNDAY	13	HOLIDAY	11	HOLIDAY	15	PONGAL/ HOLIDAY	12	HOLIDAY	12	HOLIDAY					16	HOLIDAY
MONDAY	14		12		16	PONGAL / HOLIDAY	13		13						17	
TUESDAY	15		13		17		14		14	PREPARATION & LAB END EXAMINATIONS					18	
WEDNESDAY	16		14		18		15		15						19	
THURSDAY	17		15		19		16		16						20	
FRIDAY	18		16		20		17		17	I SEMESTER END EXAMINATIONS					21	
SATURDAY	19		17		21		18	SIVARATHRI/ HOLIDAY	18						22	
SUNDAY	20	HOLIDAY	18	HOLIDAY	22	HOLIDAY	19	HOLIDAY	19	HOLIDAY					23	HOLIDAY
MONDAY	21		19		23		20		20						24	
TUESDAY	22		20		24		21		21	I SEMESTER END EXAMINATIONS					25	
WEDNESDAY	23		21		25		22		22	UGADI					26	
THURSDAY	24		22		26	REPUBLIC DAY	23		23						27	
FRIDAY	25		23		27		24		24	I SEMESTER END EXAMINATIONS					28	
SATURDAY	26		24		28		25		25						29	
SUNDAY	27	HOLIDAY	25	X-MAS	29	HOLIDAY	26	HOLIDAY	26	HOLIDAY					30	HOLIDAY
MONDAY	28		26	BOXING DAY/ HOLIDAY	30		27		27							
TUESDAY	29		27		31		28		28	I SEMESTER END EXAMINATIONS						
WEDNESDAY	30		28						29							
THURSDAY			29						30	SRI RAMA NAVAMI						
FRIDAY			30	MID I EXAM					31	I SEMESTER END EXAMINATIONS						
SATURDAY			31	MID I EXAM												

ENGINEERING CHEMISTRY LECTURE NOTES

BR 22-B.Tech – Computer Science & Engineering

SRI INDU COLLEGE OF ENGINEERING &TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech -I Year -I Semester

(R22CHE1112) ENGINEERING CHEMISTRY

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Course Objectives:

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion it's control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineering materials.
4. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT - I: Water and its treatment: [8]

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation - Determination of F^- ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – II Battery Chemistry& Corrosion [8]

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials: [8]

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP).

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: [8]

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT - V: Engineering Materials: [8]

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

	SRI INDU COLLEGE OF ENGG & TECH LESSON PLAN (Regulation :R22) Department of Computer Science Engineering	Prepared on 24/11/2022 Rev1: Page: 3 of 38
	Sub. Code & Title | **(R22CHE1112) ENGINEERING CHEMISTRY**	
	Academic Year: 2022-23 | **Year/Sem./Section** | **I / I / CSE A & B**	
	Faculty Name & Designation | **A.SHIVA KUMAR ASSISTANT PROFFESOR.**	

Unit/ Item No.	Topic (s)	Book Reference	Page (s) From	Page (s) To	Teaching Methodology	Proposed No. of Periods	Actual Date of Handled	CO//RBT
	UNIT – I							
I	**WATER AND IT'S TREATMENT**					**11**		
1.1	Introduction – hardness of water	T2	45	47	Black board	1		CO2/I
1.2	Causes of hardness - types of hardness temporary and permanent hardness	T2	52	53	PPT	1		CO2/ II
1.3	Expression and units of hardness, Numerical problems	T2	55	56	Black board	1		CO2/II
1.4	Estimation of hardness of water by complexometric method	T2	57	58	Black board	1		CO2/IV
1.5	Potable water and its specifications and Steps involved in treatment of water	T2	74	77	Black board	1		CO2/II
1.6	Disinfection of water by chlorination and break point chlorination	T2	78	79	PPT	1		CO2/II
1.7	Defluoridation – Determination of Fluoride ion by ion selective electrode method.	T2	82	84	PPT	1		CO2/II
1.8	Boiler troubles-scales & sludge's , caustic embrittlement	T2	59	61	Black board	1		CO2/II
1.9	boiler feed water-internal treatment – (Calgon conditioning, Phosphate conditioning and Colloidal conditioning).	T2	65	65	Black board	1		CO2/III
1.10	External treatment of water – ion exchange process.	T2	66	73	Black board	1		CO2/II
1.11	Desalination of water – Reverse osmosis.	T2	79	80	Black board	1		CO2/II
	Revision				MCQ's			
	Total Periods					11		
	Review	**Signature of the HOD/Coordinator**						

Unit/ Item No.	Topic (s)	Book Reference	Page (s)		Teaching Methodology	Proposed No. of Periods	**Actual Date of Handled**	**CO/RBT**
	UNIT –II							
II	**BATTERY CHEMISTRY AND CORROSION**					**12**		
2.1	Introduction to Electro chemistry	T2	105	107	Black board	1		CO 1,4 /I
2.2	Introduction to Batteries Classification of Batteries	T1	138	138	Black board	1		CO 1,4/I
2.3	Primary Batteries - Examples	T1	138	139	Black board	1		CO 1,4/II
2.4	Secondary Batteries – Construction & working of Li ion battery and its	T1	140	141	PPT	1		CO 1,4/II

	applications for Electrical vehicles.							
2.5	Reserve Batteries –Examples Construction & applications of Zn-air battery.	T1	141	142	PPT	1		CO 1,4/III
2.6	Fuel Cells – Construction and working of Methanol Oxygen Fuel cells.	T1	142	145	Black board	1		CO 1,4/II
2.7	Construction and working of Solid oxide fuel cell, Solar cells and its applications.	T1	139	141	Black board	1		CO 1,4/II
2.8	Corrosion**:** Causes and effects of corrosion – Mechanism of chemical corrosion.	T2	159	161	Black board	1		CO 1,4 /II
2.9	Electrochemical corrosion – mechanism of electrochemical corrosion.	T2	163	165	Black board	1		CO 1,4/II
2.10	types of wet corrosion: Galvanic, water-line and pitting corrosion	T2	166	167	Black board	1		CO 1,4/I
2.11	Factors affecting rate of corrosion.	T2	169	171	Black board	1		CO 1,4//I
2.12	Corrosion control methods- Cathodic protection - Sacrificial anode and impressed current cathodic methods	T2	172	173	PPT	1		CO 1,4/II
	Revision				Quiz			
	Total Periods					12		
	Review	**Signature of the HOD/Coordinator**						
UNIT- III								
III	**POLYMERIC MATERIALS**					**10**		
3.1	Definitions, Classification of polymers with examples.	T2	201	202	Black board	1		**CO3/II**
3.2	Types of polymerization – addition (free radical addition) and condensation polymerization – Nylon 6,6 &Terylene	T2	210	216	Demonstration	1		**CO3/II**
3.3	Plastics :Thermo plastic and Thermosetting plastics and their differences.	T2	227	230	Demonstration	1		**CO3/I**
3.4	Preparation, properties, engineering applications of: PVC, Teflon & Bakelite.	T2	225	227	Black board	1		**CO3/II**
3.5	Fiber reinforced plastics (FRP)	T2	232	239	Black board	1		**CO3/I**
3.6	Rubbers: Natural rubber and its vulcanization.	T2	235	236	Black board	1		**CO3/III**
3.7	Elastomers : Characteristics – preparation –properties of Buna –S ,Butyl & Thiokol rubber.	T2	236	239	Demonstration	1		**CO3/II**
3.8	**Conducting polymers:** Characteristics and Classification.	T2	240	242	Demonstration	1		**CO3/II**
3.9	Mechanism of conduction in trans-poly acetylene and applications of conducting polymers.	T2	243	246	Black board	1		**CO3/III**
3.10	Biodegradable polymers**:** Concept and advantages. Poly lactic acid and poly vinyl alcohol and their applications.	T2	248	249	Black board	1		**CO3/III**
	Revision							
	Total Periods					10		
	Review	**Signature of the HOD/Coordinator**						

UNIT-IV								
IV	ENERGY SOURCES					**8**		
4.1	Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula.	T2	473	476	PPT	1		CO5/I
4.2	Classification-solid fuels: coal – analysis of coal–proximate analysis ultimate analysis and their significance.	T2	490	496	Black board	1		CO5/II
4.3	Liquid fuels – petroleum and its refining,	T2	497	500		1		CO5/II
4.4	Cracking types – moving bed catalytic cracking.	T2	501	505	Black board	1		CO5/III
4.5	Knocking – octane and cetane rating,	T2	505	508	PPT	1		CO5/III
4.6	synthetic petrol - Fischer-Tropsch's process	T2	508	509	Black board	1		CO5/II
4.7	Gaseous fuels – composition and uses of natural gas, LPG and CNG,	T2	509	510	Black board	1		CO5/II
4.8	Biodiesel-Trans esterification, advantages.	T2	4.34	4.35	Black board	1		CO5/III
	Revision				Seminars			
	Total Periods					8		
	Review	**Signature of the HOD/Coordinator**						
UNIT-V								
V	**ENGINEERING MATERAILS**					**8**		
5.1	Cement: Portland cement, its composition, setting and hardening.	T2	409	416	Demonstration	1		CO3/II
5.2	Smart materials and their engineering applications	T2	434	435	Black board	1		CO3/III
5.3	Shape memory materials- Poly L- Lactic acid.	T2	436	438	Black board	1		CO3/III
5.4	Thermo response materials- Polyacryl amides, Poly vinylamides	T2	438	439	Black board	1		CO3/III
5.5	Lubricants: Classification of lubricants with examples.	T2	419	420	PPT	1		CO3/II
5.6	Characteristics of a good lubricants	T2	420	421	Black board	1		CO3/I
5.7	Mechanism of lubrication (thick film, thin film and extreme pressure)	T2	419	422	Black board	1		CO3/III
5.8	Properties of lubricants: viscosity, cloud point,	T2	421	422	Demonstration	1		CO3/II
	Revision				MCQ's			
	Total Periods					8		
	Review	**Signature of the HOD/Coordinator**						

LIST OF TEXT BOOKS AND REFERENCES

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning,2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K.Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

WEB REFERENCES FOR CHEMISTRY

W1. https://www.ch.ic.ac.uk/vchemlib/course/mo_theory/main.html

W2. https://chemed.chem.purdue.edu/genchem/topicreview/bp/ch12/crystal.php

W3.https://puretecwater.com/downloads/basics-of-reverse-osmosis.pdf

W4. http://staffnew.uny.ac.id/upload/132206549/pendidikan/04a_HARD+WATER.pdf

W5. http://www.demiwater.nl/files/AWT_Tf-024.pdf

W6. https://searchmobilecomputing.techtarget.com/definition/battery

W7. https://byjus.com/jee/polymers

W8. http://www.behranoil.com/upload/upload/1471064098.pdf

CONTENT BEYOND THE SYLLABUS

S. No	Topics	Proposed Actions	Date	Resource Person/Mode	POs	PSOs
1	Stand by batteries ,mechanism & applications	To get knowledge		A. Shiva Kumar	PO1,PO2	PSO1,PSO2
2	Bio medical applications of bio degradable polymers	To get knowledge		U. Sahitya	PO1,PO2	PSO1,PSO2

ASSIGNMENT

SL.No	Assignment Questions	Course Outcome	Books To be Referred	Date of Announcement	Date Of Submission
1	Estimate the Hardness of water by Using EDTA method. Discuss the principle involved in it?**(V-Evaluating)**	CO2	T2		
2	Discuss the Ion Exchange method for softening of water? **(III-Applying)**	CO2	T2		
3	What are reserve batteries? Explain its mechanism with suitable example? **(I-Remembering)**	CO1,4	T2		
4	Discuss the detailed mechanism of Electrochemical Corrosion with an example? **(IV –Analyzing)**	CO1,4	T2		
5	Differentiate thermo plastic and thermo setting plastics with example? **(IV –Analyzing)**	CO3	T2		
6	Explain the mechanism of Conducting Polymers with suitable examples and give its applications? **(L2-Understanding)**	CO3	T2		
7	Explain proximate analysis of coal and it's significance? **(L2-Understanding)**	CO5	T2		
8	What is cracking? Describe the moving bed catalytic cracking with a neat sketch? **(L2-Understanding)**	CO5	T2		
9	How is **Portland cement** manufactured by wet and dry process? Give the detailed flow diagram. **(L2-Understanding)**	CO5	T2		

10	Explain different methods of mechanism of lubrication? **(L2-Understanding)**	CO5	T2		

Sub. Code & Title	**(R22CHE1112) ENGINEERING CHEMISTRY**		
Academic Year: 2022-23		**Year/Sem./Section**	**I/I/CSE A&B**
Faculty Name & Designation		**A.SHIVA KUMAR ASSISTANT PROFFESOR.**	

SELF STUDY TOPICS

S.NO	Topics	Books and Journals	Course Outcomes
1	External water Treatments –Lime Soda and Zeolite Process		CO 2
2	Different classes of batteries		CO 1,4
3	Bio degradable polymers		CO 3
4	Synthetic petrol - Bergius process		CO 5
5	Extreme pressure lubricants - Examples		CO 3

	SRI INDU COLLEGE OF ENGG & TECH (Regulation :R22) Department of Computer Science Engineering		Prepared on 24/11/2022 Rev1: Page: 9 of 38
	Sub. Code & Title	(R22CHE1112) CHEMISTRY	
	Academic Year: 2022-23	Year/Sem./Section	I/I/CSE A&B
	Faculty Name & Designation	A.SHIVA KUMAR ASSISTANT PROFFESOR.	

(Common to EEE, CSE, IT, DS. CS & CSIT)

QUESTION BANK WITH BLOOMS TAXONOMY LEVEL (BTL)

(1. Remembering 2.Understanding, 3.Applying 4.Analyzing
5 .Evaluating 6. Creating)

UNIT-I : WATER AND ITS TREATMENT

	MULTIPLE CHOICE QUESTIONS (MCQ'S)	BT Level	Course Outcome
1C1	Temperary hardness in water is removed by a) Filtration b) Sedimentation C)Boiling D)Coagulation	I	CO2
1C2	Calgon is a trade name given to a)Sodium silicate b) sodium hexa meta phosphate c)sodium meta phosphate d)calcium phosphate	I	CO2
1C3	The membrane filtration adopted in reverse osmosis is also called a)Super filtration b) supra filtration c) ultra filtration d) hypo filtration	II	CO2
1C4	The ratio of chlorine and ammonia in chloramines used for disinfection of municipal water is a)1: 2 b) 2:1 c) 4:1 d) 1:3	II	CO2
1C5	Caustic embrittlement is a type of a)boiler corrosion b)conditioning c)scale formation d)sludge formation	I	CO2
1C6	The water containing dissolved salts with a peculiar salty taste is called a)Hard water b) soft water c) Brakish water d) Heavy water	I	CO2
1C7	In Phosphate conditioning the most preferred reagent is a)$NaHPO_4$ b)Na_2HPO_4 c) Na_3PO_4 d)NaH_2PO_4	I	CO2
1C8	Tannin and lignin are used for a) Phosphate conditioning b) Colloidal conditioning a) Calgon conditioning d) Carbonate conditioning	II	CO2
1C9	Caustic embrittlement caused due to the presence of a)Nacl b) NaOH c) $MgCO_3$ d) KNO_3	II	CO2
1C10	In EDTA titration, the colour of the end point is a)Red b) Blue c) yellow d) No change	II	CO2
1C11	The role of water in washing is as a)Coolant b) Reagent c) Solvent d) Detergent	I	CO2
1C12	The P^H maintained in the complexometric estimation of hardness of water is about a)7 b) 10 c) 5 d)15	I	CO2
	FILL IN THE BLANKS	**BT Level**	**Course Outcome**
1F1	---------- is used as an indicator in the determination of hardness by EDTA method.	I	CO2
1F2	Loose and slimy precipitate formed with in the boiler is ----------		CO2
1F3	The Purest form of natural water is ----------	I	CO2
1F4	Disinfection by bleaching powder is also called ----------	I	CO2
1F5	Anion exchange resins are regenerated by using ----------	I	CO2
1F6	One ppm of hardness is equal to ---------- ^{0} Cl	I	CO2

1F7	EDTA is ----------	I	CO2
1F8	Sulphates and Chlorides of calcium and magnesium causes ----------	II	CO2
1F9	The colour of EBT indicator is ----------	I	CO2
1F10	Ion free water is also known as ----------	I	CO2
	MATCH THE FOLLOWING QUESTIONS	**BT Level**	**Course Outcome**
1M1	a) Desalination — i) Carbonate hardness b) Temporary hardness — ii)Non carbonate hardness c) Calgon — iii) Reverse osmosis d) Permanent hardness — iv)Sodium hexa metaphosphate	I	CO2
1M2	a) Phosphate conditioning — i) Hypo chlorination b) Bleaching powder — ii) Na_3PO_4 c) Semi permeable membrane — iii) $ClNH_2$ d) Chloramine — iv) Cellulose acetate	I	CO2
1M3	a)Soft and loose precipitate — i) Scales b) Calcium sulphate salts — ii) Sodium salts c) Caustic embrittlement — iii) RH and R-OH d)Ion exchange process — iv) Sludge	I	CO2
	DESCRIPTIVE QUESTIONS	**BT Level**	**Course Outcome**
1D1	a)Explain the disinfectation of water by Chlorination ? b) What are the specifications of potable water?	II	CO2
1D2	Explain the following a) Phosphate Conditioning b) Caustic embrittlement	II	CO2
1D3	What are the steps involved in the treatment of potable water?	I	CO2
1D4	Explain the following a) Scales & Sludge's b) Colloidal conditioning.	II	CO2
1D5	Explain the following a) Deflouridation b) Calgon Conditioning.	II	CO2
1D6	Explain the Desalination of Brackish water by Reverse osmosis with a neat sketch?	II	CO2
1D7	Estimate the Hardness of water by using EDTA method. Discuss the principle involved in it?	V	CO2
1D8	Discuss the Ion Exchange method for softening of water?	III	CO2
1D9	a) Distinguish between temporary hardness and permanent hardness of water? b) A sample of hard water contains 14.6 mgs of $Mg(HCo_3)_2$, 9.5 mgs of $MgCl_2$, 13.6mgs of $CaSO_4$, 10mgs of Silica, then calculate the Permanent, Temporary and Total hardness of given water sample in Degree Clarke & Degree French?	IV	CO2
1D10	Determine the fluoride ion by using ion selective electrode method?	V	CO2
	UNIT-II : BATTERY CHEMISTRY & CORROSION		
	MULTIPLE CHOICE QUESTIONS (MCQ'S)	**BT Level**	**Course Outcome**
2C1	The cell whose cell reaction is reversible is called a) Fuel cell b) Primary cell c) secondary cell d) All the above	I	CO 1,4
2C2	Which of the following is a primary cell a) mercury battery b) Lithium battery c) Ni –Cd cell d) Pb acid cell	I	CO 1,4
2C3	A galvanic cell converts a) electrical energy to chemical energy b) chemical energy to electrical energy c) electric energy to heat energy d) heat energy to electric energy	II	CO 1,4
2C4	The current flow through electrolyte is due to the movement of a) Ions b) Holes c) Electrons d) None of the above	I	CO 1,4

2C5	Which of the following acts as a fuel in methanol oxygen fuel cell a) CH_3OH b) H_2 c) O_2 d) None of the above	II	CO 1,4
2C6	A fuel cells converts .....energy into electrical energy a) Mechanical b) Magnetic c) Solar d) Chemical	I	CO 1,4
2C7	Which of the following material is used in solar cells? a)Barium b) Silicon c) Silver d) Selenium	I	CO 1,4
2C8	One of the common sacrificial anodic metal is a)Iron b)magnesium c) copper d) titanium	I	CO 1,4
2C9	During the electro chemical corrosion in acidic environment a) O_2 evolution occurs b) O_2 absorption occurs c) H_2 evolution occurs d) H_2 absorption occurs	I	CO 1,4
2C10	Corrosion is a process of. a) Reduction b) Oxidation c) neutralization d) none of the above	II	CO 1,4
2C11	In electrochemical corrosion a) anode undergo oxidation b) Cathode undergo oxidation c) anode undergo reduction d) Both cathode and anode undergo oxidation	II	CO 1,4
2C12	During galvanic corrosion the more noble metal acts as a) anode b) Cathode c) anode as well as cathode d) corroding metal	II	CO 1,4
	FILL IN THE BLANKS	**BT Level**	**Course Outcome**
2F1	The solid oxide fuel cell active at ---------- temperature.	I	CO 1,4
2F2	In Zn –air battery,---------- acts as Cathode.	I	CO 1,4
2F3	The EMF measurement are accurately determined by ----------	II	CO 1,4
2F4	In lithium cells lithium is used as ----------	I	CO 1,4
2F5	The electrolyte used in lead storage battery is ----------	I	CO 1,4
2F6	The ratio of the volume of the metal oxide to the volume of metal is known as ----------	II	CO 1,4
2F7	The chemical composition of rust is ----------	I	CO 1,4
2F8	The Chemical corrosion is also called as ----------	I	CO 1,4
2F9	Impurities in metals causes ----------	II	CO 1,4
2F10	When specific volume ratio decreases, the rate of corrosion ----------	I	CO 1,4
	MATCH THE FOLLOWING QUESTIONS	**BT Level**	**Course Outcome**
2M1	a) Lithium cells — i) Rechargeable batteries b) Lithium ion cells — ii) Primary cells c) H_2SO_4 — iii) Light weight d)Fuel cells — iv) Lead acid cells	I	CO2
2M2	a) Galvanic cell — i) Stand by battery b) Zn-air cell — ii) Germanium c) Reserve battery — iii)oxygen acts as Cathode d) Solar cells — iv) Redox reaction	I	CO2
2M3	a) Rusting of iron — i) Stable film b) Protective layer — ii)Wet corrosion c) Dry corrosion — iii) Non protective layer d) Porous oxide film — iv) Chemical corrosion	I	CO2

DESCRIPTIVE QUESTIONS		BT Level	Course Outcome
2D1	a) What are Primary cells? Explain its mechanism with examples? b) What are the applications of lithium ion batteries to electric vehicles?	I	CO 1,4
2D2	a) What are reserve batteries? Explain its mechanism with suitable example? b) What are secondary cells? Explain its mechanism with examples?	I	CO 1,4
2D3	a) Explain the working principle of the Solid oxide fuel cell? Give its applications? **b)** Explain about galvanic corrosion ?	IV	CO 1,4
2D4	a) Distinguish between batteries and fuel cells? b) Explain about the solar cells? Write it's applications ?	IV	CO 1,4
2D5	Give a brief account on the following a)Lithium ion batteries b) Zn – air batteries	IV	CO 1,4
2D6	a) Define fuel cell? Explain the construction and working principle of methanol -oxygen fuel cell? b) Explain about Pitting corrosion?	I	CO 1,4
2D7	a) Explain the factors which influencing the rate of corrosion? b) Explain about waterline corrosion?	I	CO 1,4
2D8	a) What is cathodic protection? Explain Sacrificial anodic protection control of corrosion? b) Explain the Mechanism of Oxidation Corrosion?	II	CO 1,4
2D9	a) What is cathodic protection? Explain impressed current cathodic protection? **b)** State and explain Pilling bed worth rule?	I	CO 1,4
2D10	Discuss the detailed mechanism of Electrochemical Corrosion with an example?	IV	CO 1,4

UNIT- III : POLYMERIC MATERIALS

MULTIPLE CHOICE QUESTIONS (MCQ'S)		BT Level	Course Outcome
3C1	Which one of the following is a thermosetting plastic a)PVC b) PVA c) Bakelite d) None of the above	I	CO 3
3C2	The repeating unit of PVC is a)ethylene b) Tetra chloro ethylene c) acrylo nitrile d) Vinyl chloride	I	CO 3
3C3	Nylon is a a) vinyl polymer b) polyamide c) polyester d) chloroprene	I	CO 3
3C4	---------- can undergo addition polymerization a)Saturated compounds b) Cyclic compounds c) Olefin compounds d) None	II	CO 3
3C5	The structural units of Polymers are called a) fibres b) monomers c) Fabrics d) Elastomers	I	CO 3
3C6	Which of the following is not an example of addition polymer? (a) Polythene (b) Polystyrene (c) Neoprene (d) Nylon 6,6	II	CO 3
3C7	Which of the following is a condensation polymer? (a) Teflon (b) PVC (c) Terylene (d) Neoprene	I	CO 3
3C8	Which of the following is a natural rubber a)Polyester b) Isoprene c) Starch d) Nylon -6	I	CO 3
3C9	Which of the following is not an example of elastomer? (a) Nylon 6,6 (b) Terylene (c) Thokol (d) Bakelite	I	CO 3
3C10	Nylon threads are made of a)Polyester polymer b) Polyamide polymer c)Polyethylene polymer d) Polyvinyl polymer	II	CO 3
3C11	Which of the following contain isoprene units a)Natural rubber b) Nylon 6,6 c) Dacron d) P.E	II	CO 3
3C12	An organic polymer can be converted in to conducting polymer if it has a) Branched structure b) Aromatic character c) Conjugation d) None of the above	I	CO 3
FILL IN THE BLANKS		**BT Level**	**Course Outcome**
3F1	The monomer of Teflon is ----------	I	CO 3

3F2	---------- are the monomers of bakelite	II	CO 3
3F3	The structural unit of the polymer is known as ----------	I	CO 3
3F4	The different monomers involved in polymerization to produce ---------- polymers	I	CO 3
3F5	HMDA and ---------- are the monomers of Nylon 6,6	I	CO 3
3F6	Terylene is a condensation polymer of ethylene glycol and ----------	I	CO 3
3F7	---------- is an vital element to do the vulcanization	I	CO 3
3F8	---------- is an example of biodegradable Polymers.	II	CO 3
3F9	---------- are the monomers of Buna –N rubber	II	CO 3
3F10	Trans poly acetylene is an example of ---------- polymer	I	CO 3
	MATCH THE FOLLOWING QUESTIONS	**BT Level**	**Course Outcome**
3M1	a) HMDA — i) Teflon b)Tetra fluoro ethylene — ii) Nylon 6,6 c)PVC — iii) Bakelite d) Phenol & Formaldehyde — iv) Vinyl chloride	I	CO 3
3M2	a) Respond to heat — i) Buna -S b) Thermoset plastics — ii) Thread like structures c) Fibres — iii) Thermo plastics d) Elastomer — iv) Not respond to heat	I	CO 3
3M3	a) Smaller molecule — i) Rubber b) Homo polymer — ii) Condensation polymer c) Terylene — iii) Monomer d) Elasticity — iv) Poly Ethene	I	CO 3
	DESCRIPTIVE QUESTIONS	**BT Level**	**Course Outcome**
3D1	What are Polymers? How are they Classified? Explain them with suitable examples?	II	CO 3
3D2	Write the mechanism of a) Free radical addition polymerization b) Condensation polymerization	I	CO 3
3D3	Differentiate thermo plastic and thermo setting plastics with example?	IV	CO 3
3D4	Explain the preparation, properties and applications of the following a) TEFLON (PTFE) b) PVC	V	CO 3
3D5	Explain the preparation ,properties and applications of following polymers a) Nylon-6:6 b) Bakelite.	II	CO 3
3D6	Write a brief account on the following a) Thiokol Rubber b) FRP	II	CO 3
3D7	Explain about bio degradable polymers with examples?	II	CO 3
3D8	Write a short note on the Following a) Butyl Rubber b) Buna –S Rubber.	II	CO 3
3D9	Describe the following a) Vulcanization of rubber b) Terylene	II	CO 3
3D10	What are Conducting Polymers? Explain the mechanism of Conducting Polymers with suitable examples and give its applications?	II	CO 3
	UNIT- IV : <u>ENERGY SOURCES</u>		
	MULTIPLE CHOICE QUESTION	**BT Level**	**Course Outcome**

4C1	Octane number is related with the following petrol product a)Diesel b) Petrol c) Kerosene d) Lubricating oil	IV	CO 5
4C2	For improving anti knocking property of petrol , it is mixed with a) Tetra methyl lead and lead bromide b) Tetra methyl lead c) Allyl bromide d) Lead bromide	III	CO 5
4C3	The calorific value of fuel expressed as a) kcal/cm b) kcal/cm^3 c) kcal/m^3 d) charcoal	I	CO 5
4C4	The calorific value of coal sample higher if it's a)Moisture content is high b) Volatile matter is high c)Fixed carbon content is high d) Ash content is hig4	II	CO 5
4C5	Which of the following is used as a jet engine fuel? a)Diesel b) Petrol c) Kerosene d) Lubricating oil	II	CO 5
4C6	Ultimate analysis of a fuel is to determine the % of a)C,H,N,S and O b) S only c) fixed carbon d) ash and Volatile matter.	II	CO 5
4C7	Cetane number is related to one of the following a)Petrol b)Diesel C) Kerosene d) None of the above	I	CO 5
4C8	Petrol is synthesized from water gas by a)Fischer Tropsch's b)Bergius process c) Thermal cracking d)catalytic cracking	I	CO 5
4C9	The main component of LPG is a)n-Butane b) Methane c) Propane d) Ethylene	I	CO 5
4C10	The fuel which gives more smoke a) LPG b) Petrol c) CNG d) Coal	II	CO 5
4C11	The type of reaction in the combustion of fuel is a)Redox b) Elimination c)Precipitation d) Neutralization	II	CO 5
4C12	Which is not a fossil fuel a)Petroleum b)Hydrogen c) Natural gas d) Coal	I	CO 5
	FILL IN THE BLANKS	**BT Level**	**Course Outcome**
4F1	The total quantity of heat liberated by combustion of unit mass of substance is called--------	I	CO 5
4F2	The process of separation of various fractions of petroleum is known as ----------	I	CO 5
4F3	---------- Is an example of primary solid fuel.	I	CO 5
4F4	Crude oil treated with copper sulphide to remove ---------- from it.	II	CO 5
4F5	---------- is the primary liquid fuel in nature.	I	CO 5
4F6	A good fuel should posses ---------- moisture content.	II	CO 5
4F7	The cetane number of diesel can be improved by adding ----------	II	CO 5
4F8	The major composition of CNG is----------	I	CO 5
4F9	To give warning of leakage of LPG ------- are added.	II	CO 5
4F10	The compound with octane number 100 is ----------	I	CO 5
	MATCH THE FOLLOWING QUESTIONS	**BT Level**	**Course Outcome**
4M1	a) Diesel – i) Petrol b)Octane number – ii) Kerosene c)Jet engine fuel – iii) Coal d) Proximate analysis – iv) Cetane number	I	CO5
4M2	a) calorific value – i) Crude oil b)Synthetic petrol – ii) Coalification c)Petroleum – iii) K.cal d)conversion of wood in to coal – iv) Fischer-Tropsch's method	I	CO5
4M3	a) Dulong's formulae – i) Refining of petroleum b)Ultimate anlysis – ii) calculation of CV c)Fractional distillation – iii) Water gas d) $CO + H_2$ – iv) Coal	I	CO5

DESCRIPTIVE QUESTIONS		BT Level	Course Outcome
4D1	Discuss Fischer-Tropsch method for preparation of synthetic petrol?	IV	CO 5
4D2	Explain proximate analysis of coal and it's significance?	II	CO 5
4D3	Explain briefly ultimate analysis of coal and it's significance?	II	CO 5
4D4	What is cracking? Describe the moving bed catalytic cracking with a neat sketch?	II	CO 5
4D5	Explain the following a) Define Calorific Value? Explain different types of Calorific Values with units. b) Write a note on CNG?	V	CO 5
4D6	Explain the following a)Octane rating b) cetane rating	II	CO 5
4D7	Explain the following a)Knocking b) Bio diesel	II	CO 5
4D8	Write a short on the following a)Refining of petroleum b) Characteristics of a good fuel ?	I	CO 5
4D9	Explain theoretical calculation of Calorific value by using Dulong's formulae?	II	CO 5
4D10	Explain the following a) Natural gas b) LPG	II	CO 5

UNIT- V : ENGINEERING MATERIALS

MULTIPLE CHOICE QUESTIONS (MCQ'S)		BT Level	Course Outcome
5C1	Edible oil is an example of a}lubricating oils b)Semi solid lubricant c)Solid lubricant d)grease	I	CO 3
5C2	Which of the following lubricants obtained during fractional distillation of petroleum a)Liquid lubricants b)petroleum oils c)blended oils d)synthetic lubricants	II	CO 3
5C3	A lubricant can decomposes due to a)oxidation b) hydrolysis c) pyrolysis d) all the above	II	CO 3
5C4	Which of the following lubricants persist under drastic conditions a)Liquid lubricants b)semi solid lubricants c) extreme pressure additives d) solid lubricants	II	CO 3
5C5	Lubricants are used to a) reduce corrosion b)reduce wearing c)reduce friction d)all the above	I	CO 3
5C6	---------- reduces the strength of cement a) clay b)sand c) excess of lime d) gypsum	I	CO 3
5C7	A suitable lubricant for watches is a)coconut oil b) grease c) graphite d) None of the above	I	CO 3
5C8	A lubricant can be used to reduce a)Friction b) corrosion c) heat d) All the above	I	CO 3
5C9	Which one of the following is an example of thermo response material a)Poly acryl amide b) Poly lactic acid c) PVA d) None of the above	I	CO 3
5C10	Extreme pressure additives are used for a)Heavy cutting b)Light cutting c) Gears d) Internal combustion Engine	II	CO 3
5C11	In Portland cement excess of lime causes a) Cracking b)Quick setting c)Hardening d) Increasing strength.	I	CO 3
5C12	The lubricants used for high pressure and low speed machines are a)solid lubricants b) Liquid lubricants c) semi solid lubricants d) emulsions	II	CO 3

FILL IN THE BLANKS		BT Level	Course Outcome
5F1	Calcium stearate acts as a ---------- in the cement	I	CO 3
5F2	Delicate instruments exhibit ---------- lubrication.	II	CO 3
5F3	Viscosity of liquids ---------- with increasing temperature	II	CO 3

5F4	High molecular weight oils possess ---------- viscosity	II	CO 3
5F5	---------- Apparatus used to measure the flash and fire point of lubricant?	II	CO 3
5F6	---------- is the chemical composition of gypsum .	I	CO 3
5F7	-------- is an example of semi solid lubricant.	I	CO 3
5F8	---------- is an example of smart materials	I	CO 3
5F9	---------- is the chemical formulae of lime stone.	I	CO 3
5F10	Boundary film lubrication takes place by ----------	I	CO 3
	MATCH THE FOLLOWING QUESTIONS	**BT Level**	**Course Outcome**
5M1	a) Solid lubricant — i) Semi solid lubricant b) Viscocity — ii) Graphite c) Greese — iii) Fluid film Lubrication d) Thick film lubrication — iv) Rate of flow of the liquid	I	CO 3
5M2	a) Excess Lime — i) weakens b) Silica — ii Slow down the setting c) Alumina — iii) Crack d) Gypsum — iv) slow hardening	I	CO 3
5M3	a) Thermo response material — i) Al_2O_3 b) shape memory material — ii CaO c) Lime — iii) Poly vinyl amide d) Alumina — iv) Poly L- Lactic acid	I	CO 3
	DESCRIPTIVE QUESTIONS	**BT Level**	**Course Outcome**
5D1	How is **Portland cement** manufactured by wet and dry process? Give the detailed flow diagram.	II	CO 3
5D2	a) What is the Composition of Portland Cement? Give their significances. b) Define the terms Setting and Hardening of cement with suitable Chemical reactions?	I	CO 3
5D3	What are smart materials? Explain different types of smart materials with suitable examples?	I	CO 3
5D4	Write a note on the following a) Cloud & Pour Point b) Flash & Fire Point.	II	CO 3
5D5	Explain the following with suitable examples a)Shape memory materials b)Thermo response materials	V	CO 3
5D6	What are lubricants? Give it's classification with suitable examples?	I	CO 3
5D7	What are the characteristics of a good Lubricant?	I	CO 3
5D8	Explain different methods of mechanism of lubrication?	II	CO 3
5D9	Explain the mechanism of a) Thick Film Lubrication b) Extreme Pressure Lubrication.	V	CO 3
5D10	Explain the following a)Hydro dynamic /Fluid film lubrication b)Boundary /Thin film lubrication	II	CO 3

THE END

BR-22 **SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY** **D4**

I B.Tech - I Semester - I Mid Term Examination, December – 2022

(R22CHE1112) ENGINEERING CHEMISTRY

(For EEE, CSE, CS, DS, CSIT & IT)

Duration: 2 Hrs **Dt: 30-12-2022, Day-1 (AN)** **Max Marks: 30M**

Part – A

Answer *All* multiple choice questions. **Marks: 10Qx1/2M = 5M**

* **(L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating.)**

		*Blooms Taxonomy Levels	Course Outcomes
1.	Calgon is a trade name given to. [ ] A) Sodium silicate B) Sodium hexa meta phosphate C) Sodium meta phosphate D) Calcium phosphate.	I	CO2
2.	Caustic embrittlement is a type of. [ ] A) Boiler corrosion B) Conditioning C) Scale formation D) Sludge formation	I	CO2
3.	Tannin and lignin are used for. [ ] A) Phosphate conditioning B) Colloidal conditioning C) Calgon conditioning D) Carbonate conditioning.	II	CO2
4.	The role of water in washing is as. [ ] A) Coolant B) Reagent C) Solvent D) Detergent.	I	CO2
5.	The cell whose cell reaction is reversible is called. [ ] A) Fuel cell B) Primary cell C) Secondary cell D) All the above.	I	CO1
6.	Which of the following acts as a fuel in methanol oxygen fuel cell. [ ] A) CH_3OH B) H_2 C) O_2 D) None of the above.	II	CO1
7.	One of the common sacrificial anodic metal is. [ ] A) Iron B) Magnesium C) Copper D) Titanium.	I	CO1
8.	In electrochemical corrosion. [ ] A) Aanode undergo oxidation B) Cathode undergo oxidation C) Anode undergo reduction D) Both cathode and anode undergo oxidation.	II	CO1

9. Which one of the following is a thermosetting plastic. [ ] I CO3
A) PVC B) PVA C) Bakelite D) None of the above.

10. ---------- can undergo addition polymerization. [ ] II CO3
A) Saturated compounds B) Cyclic compounds C) Olefin compounds D) None.

Answer *All* fill in the blank questions. **Marks: 6Qx1/2M = 3M**

11. Loose and slimy precipitate formed with in the boiler is ----------. I CO2
12. One ppm of hardness is equal to ---------- ^{0} Cl. I CO2
13. Sulphates and Chlorides of calcium and magnesium causes ----------. II CO2
14. The solid oxide fuel cell active at ---------- temperature. I CO4
15. Impurities in metals causes ----------. II CO
16. The monomer of Teflon is ----------. I CO3

Answer *All* Match the following questions. **Marks: 2Qx1M = 2M**

17. I CO2

a) Desalination	i) Carbonate hardness
b) Temporary hardness	ii) Non carbonate hardness
c) Calgon	iii) Reverse osmosis
d) Permanent hardness	iv) Sodium hexa metaphosphate

18. I CO2

a) Lithium cells	i) Rechargeable batteries
b) Lithium ion cells	ii) Primary cells
c) H_2SO_4	iii) Light weight
d)Fuel cells	iv) Lead acid cells

P.T.O.

Part – B

Answer any *FOUR* questions. **Marks: 4Qx5M = 20M**

19. Explain the following: II CO2
a) Phosphate Conditioning and b) Caustic Embrittlement.

20. Explain the following: II CO2
a) Deflouridation and b) Calgon Conditioning.

21. Estimate the Hardness of water by using EDTA method. Discuss the principle involved in it. V CO2

22. a) Explain the working principle of the Solid oxide fuel cell. Give its applications. IV CO1
b) Explain about galvanic corrosion. IV CO1

23. a) What is cathodic protection? Explain impressed current cathodic protection. I CO1
b) State and explain Pilling bed worth rule. I CO1

24. Differentiate thermo plastic and thermo setting plastics with example. IV CO3

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BR-22 **SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY** **D4**

I B.Tech - I Semester - II Mid Term Examination, March – 2023

(R22CHE1112) ENGINEERING CHEMISTRY

(For EEE, CSE, CS, DS, CSIT & IT)

Duration: 2 Hrs **Dt: 03-03-2023, Day-1 (AN)** **Max Marks: 30M**

Part – A

Answer *All* multiple choice questions. **Marks: 10Qx1/2M = 5M**

*** (L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating.)**

			*Blooms Taxonomy Levels	Course Outcomes
1.	Which of the following is a natural rubber. A) Polyester B) Isoprene C) Starch D) Nylon -6.	[ ]	I	CO3
2.	Which of the following contain isoprene units. A) Natural rubber b) Nylon 6,6 c) Dacron d) P.E.	[ ]	II	CO3
3.	Octane number is related with the following petrol product. A) Diesel B) Petrol C) Kerosene D) Lubricating oil.	[ ]	IV	CO5
4.	Which of the following is used as a jet engine fuel? A) Diesel B) Petrol C) Kerosene D) Lubricating oil.	[ ]	II	CO5
5.	Cetane number is related to one of the following. A) Petrol B) Diesel C) Kerosene D) None of the above.	[ ]	I	CO5
6.	The fuel which gives more smoke. A) LPG B) Petrol C) CNG D) Coal.	[ ]	II	CO5
7.	Edible oil is an example of. A) lubricating oils B) Semi solid lubricant C) Solid lubricant D) grease.	[ ]	I	CO3
8.	Which of the following lubricants persist under drastic conditions? A) Liquid lubricants B) Semi solid lubricants C) Extreme pressure additives D) Solid lubricants.	[ ]	II	CO3

9. A lubricant can be used to reduce. [ ] I CO3
   A) Friction B) Corrosion C) Heat D) All the above.
10. Extreme pressure additives are used for. [ ] II CO3
   A) Heavy cutting B) Light cutting C) Gears D) Internal combustion Engine.

Answer *All* fill in the blank questions. **Marks: 6Qx1/2M = 3M**

11. _____ are the monomers of Buna –N rubber II CO3
12. The total quantity of heat liberated by combustion of unit mass of substance is called _____ I CO5
13. A good fuel should posses _____ moisture content. II CO5
14. The major composition of CNG is _____ I CO5
15. Viscosity of liquids _____ with increasing temperature II CO3
16. _____ is an example of smart materials I CO3

Answer *All* Match the following questions. **Marks: 2Qx1M = 2M**

17. I CO5

a) calorific value	i) Crude oil
b) Synthetic petrol	ii) Coalification
c) Petroleum	iii) K.cal
d) conversion of wood in to coal	iv) Fischer-Tropsch's method

18. I CO3

a) Solid lubricant	i) Semi solid lubricant
b) Viscocity	ii) Graphite
c) Greese	iii) Fluid film Lubrication
d) Thick film lubrication	iv) Rate of flow of the liquid

P.T.O.

Part – B

Answer any *FOUR* questions. **Marks: 4Qx5M = 20M**

19. Differentiate thermo plastic and thermo setting plastics with example. IV CO3
20. Describe the following: a) Vulcanization of rubber and b) Terylene. II CO3
21. Discuss Fischer-Tropsch method for preparation of synthetic petrol. IV CO5
22. Explain the following: V CO5
    a) Define Calorific Value. Explain different types of Calorific Values with units.
    b) Write a note on CNG.
23. Write a short on the following: I CO5
    a) Refining of petroleum,
    b) Characteristics of a good fuel.
24. Write a note on the following: a) Cloud & Pour Point and b) Flash & Fire Point. II CO3

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BR-18 **SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY** **D4**

(An Autonomous Institution Under 2(f) and 12(B) of UGC Act 1956, New Delhi)

I B.Tech - I Semester - I Mid Term Examinations, February - 2021

(R18ECH1101) CHEMISTRY (Civil,Mech &ECE)

Timings: 1:30 PM to 3:00 PM **27.02.2020(DAY-I - AN)** **Max Marks: 25M**

Section – A

Answer *All* the questions **Marks: 5Qx1M = 5M**

1. What are bonding molecular orbitals?
2. What are the limitations of Crystal Field Theory?
3. Distinguish between Soft water and hard water.
4. What are the units of Hardness of water?
5. Explain the Significance of Salt Bridge in Electrochemical Cell.

Section – B

Answer any *FOUR* questions **Marks: 4Qx5M = 20M**

6. Explain about crystal field splitting of'd' orbitals in octahedral and tetrahedral fields.
7. Construct the energy level diagrams of N_2 and O_2 molecules.
8. Explain the following a) **Phosphate Conditioning** b) **Reverse Osmosis.**
9. Explain the process of **Complexometric Titrations** used for **Estimation of Hardness of water** by **EDTA**.

10. Explain the following a) **Colloidal Conditioning** b) **Chlorination.**
11. a) What are **Single Electrode Potentials**? Give its units.

BR-18 **SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY** **D4**

(An Autonomous Institution Under 2(f) and 12(B) of UGC Act 1956, New Delhi)

I B.Tech - II Semester - II Mid Term Examinations, May - 2019

(R18ECH1101) CHEMISTRY – (Common to Civil, Mech, ECE)

Duration: 90Mins **Dt: 02.05.2019 AN** **Max Marks: 25M**

Section – A

Answer *All* the questions **Marks: 5Qx1M = 5M**

1. What is Tinning?
2. State Markonikov's rule and explain with example.
3. What are Griganard reagents? Give one example.
4. What are the monomers of Nylon 6, 6 and Bakelite?
5. What are the monomers of PVC and Teflon?

Section – B

Answer any *FOUR* questions **Marks: 4Qx5M = 20M**

6. a) What are the factors affecting rate of corrosion?
   b) What is Pilling-Bed worth rule? Explain.
7. a) What is cathodic protection? Explain Sacrificial anodic protection control of corrosion.
   b) What is Differential Aeration Corrosion?
8. a) Explain SN^2 mechanism with suitable examples.
   b) Write a brief account on addition reactions.
9. Explain the following. i) Saytzeff rule ii) Oxidation by chromic acid.
10. a) Write a short note on the Melting Point of polymers.
    b)What are the monomers involved in the preparation of the following polymers
    i) PVC ii) TEFLON (PTFE) iii) Nylon-6:6
11. What are Lubricants? How are they classified? Write the Characteristics of a good Lubricant.

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BR-22 **Write Your Ht.No.** **D4**

QC1133

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi) - Recognized under 2(f) and 12(B) of UGC Act 1956

IB.Tech.ISemester(REGULAR)End Examinations, March – 2023.

(R22CHE1112) ENGINEERING CHEMISTRY

20/03/2023 **(For EEE, CSE, IT, CS, DS and CSIT)** **Day- 2(FN)**

Duration: 3 Hrs **Maximum Marks: 60M**

Blooms Taxonomy : (I-Remembering, II-Understanding, III-Applying, IV-Analyzing, V-Evaluating and VI-Creating)
Course Outcomes: CO

PART – A

***Answer ALL the following questions*.** **(10Qx1M=10M)**

1.	a)	How exhausted ion exchange resins can be regenerated?	II	CO2
	b)	Mention common units used for expressing hardness of water.	V	CO2
	c)	How batteries are different from fuel cells?	II	CO1
	d)	Impure metal corrodes faster than pure metal under identical conditions. Give reason.	IV	CO1
	e)	State any two applications of conducting polymers.	III	CO3

f)	Define vulcanization.	I	CO3
g)	What is the composition of biofuel?	I	CO5
h)	How do LCV HCV of fuels differ?	II	CO5
i)	Define flash and fire point.	I	CO4
j)	Write two examples of smart materials having Engineering applications.	I	CO4

PART – B

Answer FIVE questions choosing at least one from each unit. **(5Qx10M=50M)**

UNIT-I

2.	What is meant by Desalination? Discuss about desalination of brackish water by reverse osmosis method with advantages.	II	CO2
	(OR)		
	Discuss about boiler troubles due to impure water.	I	CO2

UNIT-II

3.	Discuss the detailed mechanism of chemical corrosion with examples.	III	CO1
	(OR)		
	Write construction, working and applications on the following: i) Li-ion battery and ii) Zn-air battery.	III	CO1

UNIT-III

4.	What are biodegradable polymers? Discuss with examples and applications.	V	CO3
	(OR)		
	Define conducting polymer. Explain the mechanism of conduction in poly-acetylene.	II	CO3

UNIT-IV

5.	What is the necessity and significance of elemental analysis of coal? How can you analyze coal with the help of ultimate analysis?	III	CO5
	(OR)		
	Explain the process of cracking of heavy oil by fixed bed method. Discuss the significance of cetane and octane numbers.	IV	CO5

UNIT-V

6.	How does lubrication occur by thin film boundary lubrication? Distinguish between fluid film and boundary lubrication.	II	CO4
	(OR)		
	What do you mean by setting and hardening of cement? Discuss the various reactions involved with the help of equations.	III	CO4

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BR-16 Write Your Ht.No. D4

Subject Code: R16ECH1101

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi.) - Recognized under 2(f) and 12(B) of UGC Act 1956

I B.Tech II Semester (SUPPL.) End Examinations July - 2021

ENGINEERING CHEMISTRY

16/07/2021 (Common to EEE, ECE, CSE and IT.) Day - 4 (AN)

Duration: 3 Hrs **Maximum Marks: 70M**

SECTION-A

Answer all the following questions. **(5Qx 4M = 20M)**

1. Explain briefly about Ion selective membrane.
2. What is Sacrificial anode? What are the advantages?
3. Write the characteristics of Thermoplastic resins.
4. Describe the Calgon conditioning.
5. What is Zeta potential? Explain.

SECTION – B

Answer FIVE questions choosing at least one from each unit **(5Qx10M =50M)**

UNIT-I

6. a) Explain Nernst equations and its applications.
   b) The resistance of a 0.1 N solution of an electrolyte of 40 ohms, if the distance between the electrodes is 1.2 cm and area of cross section is 2.4 cm^2. Calculate equivalent conductivity.

(OR)

7. a) Define Conductance, explain various types of conductance.
   b) Describe Hydrogen Oxygen fuel cell with a neat diagram.

UNIT-II

8. a) Explain electrochemical correction mechanism with an example.
   b) Explain the Galvanizing process.

(OR)

9. a) How does a temperature, pH and humidity factors affect the rate of corrosion.
   b) Explain the electroplating process.

UNIT-III

10. a) Explain compressed and injection moulding with a neat diagram.
    b) Write the preparation of Nylon 6,6 and its uses.

(OR)

11. a) Explain the addition polymerism mechanism.
    b) Discuss preparation, mechanism of conducting polymer with an example and applications.

UNIT-IV

12. a) Describe Lime – soda process in removal of hardness.
    b) Write a note on natural gas and LPG gases.

(OR)

13. a) Briefly explain disinfection mechanism of chlorination process.
    b) Explain ultimate analysis of C and N elements.

UNIT-V

14. a) What are the types of adsorptions? Explain.
    b) Explain the setting harding process of cement.

(OR)

15. a) Explain the Langmiur adsorption theory.
    b) Write a note on acidic refractories and their uses.

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BR-20 Write Your Ht.No. D4

Subject Code: R20ECH1101

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi.) - Recognized under 2(f) and 12(B) of UGC Act 1956.

I B.Tech. I Semester (REGULAR) End Examinations July - 2021

CHEMISTRY

10/07/2021 [Common to EEE, CSE, CSE (CS, AIML, DS, IoT, CSIT) and IT] Day - 2 (FN)

Duration: 3 Hrs **Maximum Marks: 70**

SECTION – A

Answer all the following questions. **(5Qx 4M = 20M)**

1. Calculate the bond order for O_2 molecule using molecular orbital energy level diagram.
2. Describe reverse osmosis process.
3. Derive Nernst equation for calculation of cell emf.
4. Write about Markownikoff rule.
5. What is meant by polymers? How are they classified?

SECTION – B

Answer FIVE questions choosing at least one from each unit **(5Qx10M =50M)**

UNIT-I

6. Apply crystal field theory for octahedral and square planar geometrics.

(OR)

7. What is LCAO? Explain with suitable example.

UNIT-II

8. Describe the internal treatment of boiler water.

(OR)

9. Discuss the principle of EDTA method. Explain the estimation of hardness of water by EDTA.

UNIT-III

10. With neat sketch explain the construction and working of Methanol oxygen fuel cell.

(OR)

11. Differentiate between Dry corrosion and Wet corrosion.

UNIT-IV

12. What are conformational Isomers? Discuss the confirmations of n-butane.

(OR)

13. a) Describe R, S notations used in fixing the positions of groups in optically active compounds with the examples.
    b) Explain in detail about geometrical isomerism and discuss about E, Z system of nomenclature with examples.

UNIT-V

14. Explain preparation, properties and engineering applications of Teflon, Nylon and Bakelite.

(OR)

15. Briefly discuss about the following:
    a) Flash and Fire point.
    b) Cloud and Pour point.
    c) Mechanical stability of lubricants.

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