

Course Information Sheet

Programme: UG	Degree: B.Tech (Common for all Branches)	
Course Code: 23BS1202H	Course Title: Chemistry	
Year: I Sem: I A.Y. : 2025-26	Regulation: R23 College: ISTS (an Autonomous Institution)	
L T/P/D C: 3/0/0/3	Credits: 3	Contact Hrs: 5
Mid Marks: 30	External Marks: 70	Total Marks: 100
Teaching Hrs:	Exam Duration: 3 hrs.	

Course Information:

Course Code	Course Name	Description	Year-Sem
23BS1202H	Chemistry	<ul style="list-style-type: none"> • To familiarize engineering chemistry and its applications • To train the students on the principles and applications of electrochemistry and polymers • To introduce instrumental methods, molecular machines and switches. 	I B.Tech (Common for all Branches) Semester -1

Course outcomes:**Student will able to**

SUBJECT : CHEMISTRY		
CO.NO.	Course Outcomes	BT Level
After successful completion of this course students will be able to:		
C112.1	Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.	Understanding
C112.2	Apply the principle of Band diagrams in the application of conductors and semiconductors.	Understanding
C112.3	Compare the materials of construction for battery and electrochemical sensors.	Understanding
C112.4	Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers conducting polymers.	Applying
C112.5	Summarize the concepts of Instrumental methods and Explain the principles of spectrometry.	Analyzing

Course Articulation Matrix:

Mapping of Course Outcomes (CO) with Program Outcomes (PO) and Program Specific Outcomes (PSO's):

Course Outcomes (CO)	Program Outcomes (PO)												Program Specific Outcomes (PSO's)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C112.1	3	3	3	-	-	-	-	-	-	-	-	2	-	-
C112.2	3	2	-	-	-	-	-	-	-	-	-	2	-	-
C112.3	3	2	-	2	-	-	-	-	-	-	-	1	-	-
C112.4	3	1	-	1	-	-	2	-	-	-	-	2	-	-
C112.5	3	1	-	-	2	-	-	-	-	-	-	2	-	-
C112	3	1.8	0.6	0.6	0.4	-	0.4	-	-	-	-	1.8	-	-

Level: 3–Strongly linked | 2–Moderately linked | 1–Weakly linked

JUSTIFICATIONS OF CO –PO MAPPING

C121.1		
C112.1-P01	3	Explain the concept of dual nature of matter and understand the significance of wave function
C112.1-P02	3	Explanation of one dimensional potential well
C112.1-P03	3	Explanation of properties of an electron
C112.1-P04	--	
C112.1-P05		
C112.1-P06	--	
C112.1-P07	--	
C112.1-P08	--	
C112.1-P09	--	
C112.1-P010	--	
C112.1-P011	--	.
C112.1-P012	2	Applications of quantum mechanical treatment

C112.2		
C112.2-P01	3	Classification of semiconductors
C112.2-P02	2	Classify the superconductors and preparation of superconductors.
C112.2-P03		
C112.2-P04	--	
C112.2-P05	--	
C112.2-P06	--	
C112.2-P07	--	
C112.2-P08	--	
C112.2-P09	--	
C112.2-P010	--	
C112.2-P011	--	
C112.2-P012	2	Explain the applications of semiconductors and its uses in daily life

C112.3		
C112.3-P01	3	Explain the concept of electrochemical cells and fuel cells
C112.3-P02	2	Identify the working process of primary and secondary cells.
C112.3-P03		
C112.3-P04	2	Analyze the unknown compounds using conductometric and potentiometric experiments.
C112.3-P05	--	
C112.3-P06	--	
C112.3-P07	--	
C112.3-P08	--	
C112.3-P09	--	
C112.3-P010	--	
C112.3-P011	--	
C112.3-P012	1	Applications of Fuel cells and batteries and its uses in daily life.

C112.4		
C112.4-P01	3	Classification of polymers and elastomers.
C112.4-P02	1	Identify the resin product of thermoplastic polymer and thermosetting polymers.
C112.4-P03		
C112.4-P04	1	Identify the process of intrinsic conducting polymers and extrinsic conducting polymers.
C112.4-P05	--	
C112.4-P06	--	
C112.4-P07	2	Explain the naturally occurring and synthetic Biodegradable polymers
C112.4-P08	--	
C112.4-P09	--	
C112.4-P010	--	
C112.4-P011	--	
C112.4-P012	2	Explain the applications of plastic using recycling process.

C112.5		
C112.5-P01	3	Explanation of spectroscopy and chromatography methods.
C112.5-P02	1	Identify the unknown compounds using spectroscopy instruments by spectrum.
C112.5-P03		
C112.5-P04	--	
C112.5-P05	2	Analysis of drugs and quality using High performance liquid chromatography method.
C112.5-P06	--	
C112.5-P07	--	
C112.5-P08	--	
C112.5-P09	--	
C112.5-P010	--	
C112.5-P011	--	
C112.5-P012	2	Applications of uv spectroscopy and water purification by HPLC.

Justification for Avg CO-PO Mapping		
Mapping	Level	Justification
C112.PO1	3.0	In modern technology, Impart Knowledge of quantum mechanical treatment.
C112.PO2	1.8	To impart the knowledge of materials and Analyze the products .
C112.PO3	0.6	In nano technology days, we can impart the knowledge about quantum mechanical treatment and electron moments in various levels
C112.PO4	0.6	Use research-based knowledge can calculate the potential differences of cells
C112.PO5	0.4	Understand the problems using spectroscopy instruments .
C112.PO6		
C112.PO7	0.4	Understand the impact of the Polymers and Biodegradable polymers
C112.PO8	--	
C112.PO9	--	
C112.PO10	--	
C112.PO11	--	
C112.PO12	1.8	Life long applications of fuel cells,spectroscopy and different types of semiconducting materials.

Justification for CO-PSO Mapping

Mapping	Level	Justification
C112.PO1	--	
C112.PO2	--	
C112.PO3	--	
C112.PO4	--	
C112.PO5	--	
C112.PO6	--	
C112.PO7	--	
C112.PO8	--	
C112.PO9	--	
C112.PO10	--	
C112.PO11	--	
C112.PO12	--	

Topics beyond Syllabus

S.No.	Description	Proposed Actions
1	Explanation of Refining of petroleum.	Assignments
2	Explanation about non conventional sources of energy	Assignments

TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/PROJECTS/NPTEL ETC

Topic beyond Syllabus: Mapping with PO and PSO:

Topic beyond syllabus	Program Outcomes (PO)												Program Specific Outcomes (PSO's)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1.	3	3	2		3	-	-	-	-	-	-	2	-	-

Justification for Topic beyond the Syllabus (TBS) -PO Mapping.

Mapping	Level	Justification
TBS-PO1	3	Able to understand Refining of petroleum process
TBS-PO2	3	Students identify the separation of gases, diesel, kerosene etc by refining method.
TBS-PO3	2	Student demonstrate conventional and non conventional energy resources
TBS -PO5	3	Able to analyze the process of thermal power plants.
TBS -PO12	2	Use Applications of non conventional resources.

Justification for Topic Beyond the Syllabus (TBS) -PSO Mapping.

Mapping	Level	Justification
TBS-PSO1	--	
TBS-PSO2	--	

WEB SOURCE REFERENCES:

1	http://en.chemistry.wikipedia.org
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Syllabus / Lesson Plan:

Sl.No	Unit	Topic	No. of Periods	Text Book / Reference Book	Teaching Aid Used / Methodology	Hours
Structure and Bonding Models						
1	1	Introduction	1	TB.1	CHALK/TALK	12
2		Fundamentals of Quantum mechanics	1	TB.1	CHALK/TALK	
3		Heisenberg's Uncertainty Principle	1	TB.1	CHALK/TALK	
4		Schrodinger's time in dependent wave equation	1	TB.1	CHALK/TALK	
5		Schrodinger's time dependent wave equation	1	TB.1	CHALK/TALK	
6		particle in one dimensional box.	1	TB.2	CHALK/TALK	
7		Significance of Ψ and Ψ^2	1	TB.1	CHALK/TALK	
8		Molecular orbital theory	1	TB.1	CHALK/TALK	

9		Energy level diagram of N ₂ & O ₂	1	TB.1	CHALK/TALK		
10		Energy level diagram of CO &NO	1	TB.1	CHALK/TALK		
11		π -molecular orbitals of butadiene	1	TB.1	CHALK/TALK		
12		π -molecular orbitals of benzene	1	TB.2	CHALK/TALK		
Modern Engineering materials							
13		Introduction of Modern Engineering Materials.	1	TB.1	CHALK/TALK		
14		Basic concept of semiconductor	1	TB.1	CHALK/TALK		
15		Types of semiconductor and applications.	1	TB.1	CHALK/TALK	16	
16		Super conductors-Introduction and types of Super conductors.	1	TB.1	CHALK/TALK		
17		Basic concept, Applications of Super conductors.	1	TB.1	CHALK/TALK		
18		Supercapacitors- Introduction	1	TB.1	CHALK/TALK		
19		Basic Concept-Classification, Applications of super Capacitors	1	TB.1	CHALK/TALK		
20		Nano materials-Introduction	1	TB.1	CHALK/TALK		
21	2	Classification of Nanomaterials	1	TB.1	CHALK/TALK		
22		properties and applications of Nanomaterials	1	TB.1	CHALK/TALK		
23		Fullerenes Introduction and Classification.	1	TB.1	CHALK/TALK		
24		properties and applications of Fullerenes	1	TB.1	CHALK/TALK		
25		carbon nano tubes Introduction and Classification.	1	TB.1	CHALK/TALK		
26		properties and applications of CNT	1	TB.1	CHALK/TALK		
27		Graphines nanoparticle Introduction and Classification.	1	TB.1	CHALK/TALK		
28		properties and applications of Graphine.	1	TB.1	CHALK/TALK		
Electrochemistry and Applications							
29	3	Introduction-Electro chemical cell	1	TB.1	CHALK/TALK		
30		Galvanic cell,Nernst equation	1	TB.1	CHALK/TALK		
31		cell potential calculations, Single electrode	1	TB.1	CHALK/TALK		

32		potentiometry- potentiometric titrations(redox titration)	1	TB.1	CHALK/TALK	12
33		Concept of conductivity, Conductivity cell,	1	TB.1	CHALK/TALK	
34		conductometric titrations (acid-base titrations).	1	TB.1, TB.2	CHALK/TALK	
35		Electrochemical sensors – potentiometric sensors	1	TB.1, TB.2	CHALK/TALK	
36		Amperometric sensors with examples.	1	TB.1	CHALK/TALK	
37		Primary cells – Zinc-air battery	1	TB.1	CHALK/TALK	
38		Secondary cells –lithium-ion batterie.	1	TB.1	CHALK/TALK	
39		Fuel cells Introduction and hydrogen-oxygen fuel cell	1	TB.1	PPT	
40		Polymer Electrolyte Membrane Fuel cell.	1	TB.1	CHALK/TALK	
Polymer Chemistry						
41	4	Introduction to polymers, functionality of monomers.	1	TB.1	CHALK/TALK	14
42		chain growth polymerization	1	TB.1	CHALK/TALK	
43		step growth polymerization with examples	1	TB.1	CHALK/TALK	
44		coordination polymerization, with examples	1	TB.1	CHALK/TALK	
45		Plastics Introduction–Difference between Thermo and Thermosetting plastics	1	TB.1	CHALK/TALK	
46		Preparation, properties and applications of – PVC, Teflon.	1	TB.1	CHALK/TALK	
47		Preparation, properties and applications of Bakelite.	1	TB.1	CHALK/TALK	
48		Preparation, properties and applications of Nylon-6,6, carbon fibres.	1	TB.1	CHALK/TALK	
49		Elastomers Introduction,Preparation of Rubber.	1	TB.1	PPT	
50		Vulcanisation of Rubber	1	TB.1	CHALK/TALK	
51		preparation, properties and applications of Buna-s	1	TB.1	CHALK/TALK	
52		Preparation , properties and applications of Buna-N	1	TB.1	CHALK/TALK	
53		Conducting polymers – polyacetylene, polyaniline.	1	TB.1	CHALK/TALK	
54		Bio-Degradable polymers-PGA and PLA.	1	TB.1	CHALK/TALK	
Instrumental Methods and Applications						
55	5	Electromagnetic Spectrum	1	TB.1	CHALK/TALK	

56	Absorption of radiation: Beer-Lambert's law	1	TB.1	CHALK/TALK	11
57	UV-Visible Spectroscopy - principle.	1	TB.1	CHALK/TALK	
58	UV-Visible Spectroscopy - Electronic transitions	1	TB.1	CHALK/TALK	
59	Instrumentation of UV Spectroscopy.	1	TB.1	CHALK/TALK	
60	IR spectroscopy- fundamental modes, selection rules	1	TB.1	CHALK/TALK	
61	Instrumentation of IR spectroscopy.	1	TB.1	CHALK/TALK	
62	Chromatography-Basic Principle	1	TB.1	CHALK/TALK	
63	Classification of Chromatography	1	TB.1	CHALK/TALK	
64	HPLC- Introduction and Principle.	1	TB.1	PPT	
65	Instrumentation and Applications of HPLC.	1	TB.1	CHALK/TALK	

Topic Beyond Syllabus:

S.No.	Topic Beyond Syllabus Planning	PERIODS	Methodology	Text book/references/web references and additional text book reference
1	Explanation of Refining of petroleum.	2	Assignment	T1, T2
2	Explanation about non conventional sources of energy	2	Assignment	

Note: Bloom's Taxonomy Levels

BTL1-Remember	BTL2 – Understand	BTL3 –Apply
BTL4-Analyze	BTL5 –Evaluate	BTL6–Create

Text books (T) / Reference books (R)/Additional text books (A):

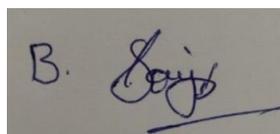
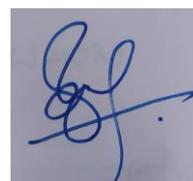
T/R/A	Book Title/Author/Publication
T1	Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
T2	Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.
R1	Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
R2	J.D. Lee, Concise Inorganic Chemistry, 5 th Edition, Wiley Publications, Feb.2008
R3	Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

ASSESSMENT METHODOLOGIES-DIRECT

<input checked="" type="checkbox"/> ASSIGNMENTS	<input checked="" type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
<input type="checkbox"/> STUD. LAB PRACTICES	<input type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS


Prepared by

Approved by