

FACULTY OF ENGINEERING

Scheme of Instruction, Syllabi & Examination

B.E. I and II Semesters (Group-A/B)

Of Four Year Degree Program in

B.E. (Common to All Branches)

(With effect from the Academic Year 2024 - 2025)

(As approved in the Faculty Meeting held on 1st July 2024)



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01/07/2024

**Chairperson
Board of Studies in Chem...
Dept of Chemistry
Osmania University, Hyd-07.**

Issued by

Dean, Faculty of Engineering

Osmania University, Hyderabad 2024

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GROUP DISTRIBUTION

B.E. (I & II – Semesters)

NUMBER OF DIVISIONS PER COURSE OF

O.U. AFFILIATED RESPECTIVE ENGINEERING COLLEGES

S. No	COLLEGE NAME	GROUP – A					No. of Div.	GROUP – B				No. of Div.	Total No. of Div.
		ECE	IT	ME	PE	AE		CSE	CE	EEE	EIE		
1	MJCET												
2	DCET												
3	NGIT												
4	GLWEC												
5	KMEC												
	TOTAL												

CE : Civil Engineering

CSE : Computer Science & Engineering

IT : Information Technology

EEE : Electrical and Electronics Engineering

EIE : Electronics and Instrumentation Engineering

ECE : Electronics and Communication Engineering

ME : Mechanical Engineering

PE : Production Engineering

AE : Automobile Engineering

CME : COMPUTER ENGINEERING (To be added for Deccan College of Engineering & Tech)

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Osmania University, Hyd-07.

SCHEME OF INSTRUCTION & EXAMINATION

B.E. (All Branches) I – Semester (Group B) II- Semester (Group A)

S. No.	Course Code	Course Title	Scheme of Instructions				Scheme of Examination			Credits
			L	T	P/D	Contact Hours/Week	CIE	SEE	Duration in Hours	
Three Week Induction Programme										
Theory Course										
1	MC112CE	Environmental Science	2	-	-	2	30	70	3	-
2	MC113PY	Essence of Indian Traditional Knowledge	2	-	-	2	30	70	3	-
3	BS102MT	Mathematics-I	3	1	-	4	30	70	3	4
4	BS204CH	Chemistry	3	1	-	4	30	70	3	4
5	ES107CS	Programming for Problem Solving	3	-	-	3	30	70	3	3
Practical/ Laboratory Course										
6	BS252CH	Chemistry Lab	-	-	3	3	25	50	3	1.5
7	ES155CS	Programming for Problem Solving Lab	-	-	4	4	25	50	3	2
8	ES157ME	Workshop/ Manufacturing Process	1	-	4	5	50	50	3	3
Total			14	02	09	27	250	500		17.5

BS: Basic Science

ES: Engineering Science

L: Lecture

T: Tutorial

P: Practical

D: Drawing

CIE: Continuous Internal Evaluation

SEE: Semester End Examination (Univ. Exam)

Note: Each contact hour is a Clock Hour.

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Osmania University, Hyd-07

BS104CH

Instruction : 3+1 periods per week Duration of

SEE : 3 hours

CIE : 30marks

SEE : 70 marks

Credits : 4

Objectives:

1. Explain the principles of electrochemical processes and study analyze working principles and applications of various batteries.
2. Gain knowledge about the causes of corrosion and its prevention. Attain knowledge about the hard water and treatment of water for drinking purpose
3. Appraise Engineering materials their classifications, structure-property relationship,
4. Expose to qualitative and quantitative parameters of chemical fuels and awareness of eco-friendly materials, fuels and processes.
5. Understand the concepts and applications of spectroscopy

Outcomes: Student will be able to:

1. **Apply** concept of electrode potential in identifying feasibility of electrochemical reaction; **develop** a more in-depth perception on working of various types of batteries and their applications especially in electric vehicles (EVs).
2. **Identify** the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods. **Estimate** the physical & chemical parameters of quality of water and explain the process of water treatment
3. **Classify** chemical fuels and grade them through qualitative analysis and **acquire** knowledge on environment-friendly bio diesel
4. **Explain** the influence of chemical structure on properties of materials and their choice in engineering applications
5. **Relate** the concept of green chemistry to **modify** engineering processes and

K.R. Reddy

H.A. Khan
01/10/2024

Sarita

M.N.

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H.A.
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Osmania University, Hyd-07.

materials. **Understand** the concepts and applications of spectroscopy

BS104CH

UNIT – I

Electrochemistry: Electrolytic conductance, its types, factors affecting electrolytic conductance. Electrochemical cells: Electrolytic and Galvanic cells. Cell notation, cell reaction and cell potentials. Nernst equation and its derivation. Applications of Nernst equation to electrode potential and emf of cells. Numerical problems. Types of electrodes, Calomel, Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode.

Battery Chemistry: Construction and Applications of Primary batteries: Zn-Carbon battery. Secondary batteries : Pb-Acid battery and Li-Ion battery, Flow Batteries (Fuel cells): Methanol-Oxygen fuel cells.

UNIT – II

Corrosion: Causes and its effects. Types of Corrosion-Dry or Chemical Corrosion and Wet or Electrochemical corrosion and their mechanism. Electrochemical corrosion – Galvanic and Waterline Corrosion. Factors influencing rate of corrosion.

Corrosion control methods: Cathodic protection methods - Sacrificial anodic and Impressed current Cathodic protection methods.

Surface coating methods: Hot Dipping-Galvanizing.

Water Chemistry: Hardness of Water-Types and units of hardness of water, estimation of hardness of water by EDTA method - Numerical problems. Alkalinity of water and its sources. Water softening by Ion exchange and Reverse Osmosis methods. Specifications of potable water. Sterilization by Chlorination. Break Point of Chlorination.

UNIT – III

Engineering Materials: Polymers: Monomer and its functionality, Polymers and degree of polymerization. Types of Polymerization - Addition, Condensation and Co-Polymerization with one example each. Classification of polymers-Plastics: (Thermoplastics & Thermosetting resins - PVC and Bakelite), Fibers: (Nylon-6:6)

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K.R. Reddy Sanita

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Elastomers: (Buna-S and Buna -N rubber).

Conducting polymers: Introduction, classification, properties and applications of conducting polymers.

Biomaterials: Introduction .Definition of Biomaterials , Preparation, properties and applications of Poly lactic acid (PLA)

UNIT – IV

Chemical Fuels: Introduction, definition and classification of chemical fuels.- primary and secondary – solid ,liquid and gaseous fuels

Requirements of a good fuel. Calorific Value – HCV and LCV. Theoretical calculations of calorific value by Dulong's formula – Numerical problems.

Solid Fuels: Coal and its Ranking. Analysis of coal-Proximate and Ultimate analysis.

Liquid Fuels: Composition and uses of Gasoline, Diesel and Kerosene. Knocking. .Fuel-rating– Octane and Cetane numbers.

Gaseous Fuels: LPG, CNG-Composition and Uses.

Biodiesel: Sources, Concept of Trans esterification, properties and applications of biodiesel. Carbon neutrality and its significance. Ethanol – Biodiesel, sources and uses.

Unit V

Spectroscopy- Description of Electromagnetic spectrum.

Principles of UV-Visible Spectroscopy: Statement of Beer-Lambert Law.

Absorption and intensity shifts: Bathochromic, Hypsochromic, Hyperchromic and Hypochromic shifts with one example each.

Principle and applications of UV – Visible Spectroscopy.

IR Spectroscopy: Principle of IR Spectroscopy. Principle and applications of IR.

NMR Spectroscopy: Principle of H 1 -NMR Spectroscopy. Multiplicity, Chemical Shift. Principle and Applications of MRI


Green Chemistry: Concept, Mention - Principles of Green chemistry – example Diels – Alder reaction

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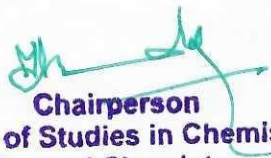
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Suggested Readings

1	, <i>Principles of Physical Chemistry</i> ,S.N. Chand &Co. New Delhi,1987
2	PCJain and M Jain ,— <i>Engineering Chemistry</i> ,DhanpatRai&Sons ,15 th Edition, New Delhi, 2004
3	JCKuriacoseandJRajaram,— <i>ChemistryinEngineeringandTechnology</i> —,TataMcGrawHill , New Delhi,2010
4	OG Palanna, — <i>Engineering Chemistry</i> ,TataMcGrawHill, New Delhi, 2009
5	S SDaraand SSU mare, — <i>Engineering Chemistry</i> ,S.N. Chand & Co. New Delhi, 2004
6	SashiChawla,— <i>Engineering Chemistry</i> , DhanpatRai&Sons, New Delhi, 2017
7	PrasantaRath,— <i>Engineering Chemistry</i> ,Cengage Learning India Pvt. Ltd, 2015
8	Dr. Kishore Palle, Dr. V. Shanthi , Dr. A. Kishore Kumar and K. Ramesh - <i>Engineering Chemistry</i> .

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Course Code	Course Title				Core/ Elective		
BS153CH	Chemistry Lab (Common to All Branches)				Core		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	3	25	50	1.5
Course Objectives <ul style="list-style-type: none"> Conduct experiments, take measurements and analyze the data through hands-on experience in order to demonstrate understanding of the theoretical concepts of quantitative Analysis while working in small group. Interpret the electro analytical principles with experimental results graphically Demonstrate writing skills through clear laboratory reports Course Outcomes On successful completion of this course, students will be able to: <ul style="list-style-type: none"> Apply the principles of Colourimetry and Electrochemistry in quantitative estimations. Estimate the rate constants of reactions from concentration of reactants/products as a function of time. Synthesize small drug molecules. 							

List of Experiments:

- Introduction to Chemical Analysis.
- Techniques of Weighing
- Volumetric Analysis:**
 - Preparation of Standard Mohr's salt solution, Standardization of KMnO_4 and estimation of ferrous ion by Permanganometry,
 - Estimation Iron(II) by Dichromatometry
- Water Analysis:**
 - Preparation of Standard Magnesium sulphate solution, Standardization of EDTA and Estimation of Total Hardness.
 - Preparation of Standard Sodium Carbonate Solution, Standardization of HCl and Estimation of Carbonate and Bicarbonate Alkalinity.
- Conductometry:**
 - Estimation of HCl
 - Estimation of CH_3COOH
 - Estimation of mixture of acids
- Potentiometry**
 - Estimation of HCl
 - Estimation of Iron
- pHmetry:**
 - Estimation of HCl
- Colorimetry:**
 - Verification of Beer-Lambert's law and estimation of Manganese
- Drug Synthesis** Preparation of Aspirin and paracetamol.

Note: Minimum ten experiments should be conducted in the semester **Suggested**

Readings:

- Senior Practical Physical Chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
- An Introduction to Practical Chemistry, K.K. Sharma and D.S. Sharma (Vikas Publishing, N. Delhi)

H. Khan
01/10/2024

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Sanita

K.R. Reddy

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