Department of Chemistry

Board of Studies – First meeting on 20-10-2022 at 03:30 pm

AGENDA

Item-1: Welcoming the distinguished Members of the Board of Studies for the BOS meeting by the Head of the Department.

Item-2: Review /Approval of the academic regulation for the B. Tech Program.

Item-3: Review /Approval of the course structure of B. Tech Program.

Item-4: Review/Approval of the detailed syllabus of Engineering Chemistry Theory.

Item-5: Review/Approval of the detailed syllabus of Engineering Chemistry Lab.

Item-6: Any other suggestions to the department.

Item-7: Vote of Thanks.

19/10/22

Md. Naseeruddin

Chairman of BoS and HoD of H&S Dept.

Department of Chemistry

BoS - Members

S.No	Name	Designation	Position
1	Mr. Md. Naseeruddin	HoD, H&S Department	Chairman
2	**Dr. Bhoomi Reddy Rama Devi**	**Prof. of Chemistry, JNTUH, UCEH**	**University Nominee**
3	**Dr. U.Umesh kumar**	**Senior Professor and HOD Osmania University**	**Subject Expert**
4	Dr. A. Hymavathi	Assoc.Prof., SIET	Specialized Faculty-1
5	Mr. Md.Naseeruddin	Professor, SIET	Specialized Faculty-2
6	Mr. Sohail Nizamuddin	Asst. Prof, SIET	Faculty
8	Mr. B. Rahul Omprakash	Assoc. Prof, SIET	Faculty
9	Mrs. G. Sujatha	Asst. Prof, SIET	Faculty

Dr. S. Sai Satyanaryana Reddy
B.E.,M.E.,Ph.D.
PRINCIPAL
SREYAS INSTITUTE OF ENGG., AND TECH.,
#9-39, Beside Indu Aranya, Bandlaguda,
Nagole, Thattiannaram, Hyd-68.

Suggestions/Remedies/Any other points

Suggestions made by **Dr. Bhoomi Reddy Rama Devi, University Nominee** and **Dr. U. Umesh kumar, Subject Expert**

1. The committee members approved R-22 academic regulation for the B.Tech program.
2. Agreed with course structure of B.Tech Programs:
    a. Engineering Chemistry Theory.
    b. Engineering Chemistry Lab.
3. After the detailed discussion on JNTUH's R-22 syllabi of Engineering Chemistry Theory and Engineering Chemistry lab, it is decided to follow the same syllabi with the few changes mentioned below.
4. Suggested to remove fluoride Ion determination by Ion selective method and to add Nalgonda technique
5. Suggested to add mechanism of free radical addition polymerization.
6. Fibre reinforced plastic can be covered through video lecture methods or can be skipped
7. In Biodegradable Polymers -only poly Vinyl Acetate is enough where as poly L- lactic acid can be covered under smart materials topic of Fifth unit.
8. Suggested to add numerical on HCV and LCV calculations.
9. Smart materials with examples of Shape Memory materials only poly L- lactic acid.
10. Suggested to add significance of properties of lubricants.
11. Suggested to add preparation of Hand sanitizers in the lab syllabus.

List of enclosures:

1) R22 Regulations
2) Course Structure
3) Syllabus

B Rama
(Dr. B. Rama Devi)

Department of Chemistry

BoS – Members Attended on 20-10-2022

S.No	Name	Designation	Position	Signature
1	Mr. Md. Naseeruddin	HoD, H&S Department	Chairman	
2	**Dr. Bhoomi Reddy Rama Devi**	**Prof. of Chemistry, JNTUH, UCEH**	**University Nominee**	
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8	Mr. B. Rahul Omprakash	Assoc. Prof, SIET	Faculty	
9	Mrs. G. Sujatha	Asst. Prof, SIET	Faculty	

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Revised Syllabus

ENGINEERING CHEMISTRY

B. Tech. I Year I Sem.

L	T	P	C
3	1	0	4

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- by Nalgonda technique.

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 with mechanism) 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.

B Laxmi (Dr. B. Ramadevi)

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 Numericals on HCV and 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 and their significance-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)

B Rama Devi
(Dr. B. Rama Devi)

JNTUH Syllabus

ENGINEERING CHEMISTRY LABORATORY

B.Tech. I Year I Sem.

L	T	P	C
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Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- Estimation of hardness of water to check its suitability for drinking purpose.
- Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
- Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
- Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
- Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
- Students are able to prepare polymers like bakelite and nylon-6.
- Estimations saponification value, surface tension and viscosity of lubricant oils.

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
II. Conductometry: Estimation of the concentration of an acid by Conductometry.
III. Potentiometry: Estimation of the amount of Fe^{+2} by Potentiomentry.
IV. pH Metry: Determination of an acid concentration using pH meter.
V. *Preparations:*
1. Preparation of Bakelite.
2. Preparation Nylon – 6.

VI. *Lubricants:*
1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

VII. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
VIII. *Virtual lab experiments*
1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

B. Ramadevi
(Dr. B. Ramadevi)