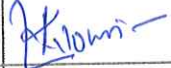





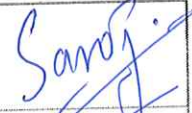



CMRCET/H&S/CHE/BOS/2022/1

Date: 12.10.2022

DEPARTMENT OF CHEMISTRY

BOARD OF STUDIES AS PER UGC NORMS

S.No	Position	Composition	Name	Signature
1	Chairman	Associate Professor	Dr. K.SOUJANYA Head of the Department	
2	Member	Expert Nominated by Vice-Chancellor/University	DR K VIDYA Assistant Professor, JNTUH University College of Engineering, Jagityal	
3	Member	Expert from Industry/ R&D	DR G RAGHAVA RAO Director, Madin Life Sciences Pvt.Ltd., IDA Mallapur, Hyderabad	
4	Member	External Expert nominated by the Academic Council (1)	DR. SOMESHWAR POLA Department of Chemistry, University college of Science, Osmania University	
5	Member	External Expert nominated by the Academic Council (2)	DR K VENKATESHWAR REDDY Professor, CMR Engineering College, Kandlakoya, Hyderabad	
6	Member	Senior Faculty of the Department	Dr. M. RAVI KUMAR, Assistant Professor	
7	Member	Senior Faculty of the Department	Ms. J. SAROJA Assistant Professor	
8	Member	Senior Faculty of the Department	Lt. D. DIVYA Assistant Professor	


HEAD OF THE DEPARTMENT

BOARD OF STUDIES MEETING ON CHEMISTRY

DEPARTMENT OF H&S

Date	:	12-10-2022
Start time	:	2.00 P.M
End time	:	04:20 P.M.
Location	:	213 (AECS LAB), BLOCK-I
Mode of meeting	:	Off-line

Meeting Objectives:

The Board of Studies meeting is held in off-line mode on 12th October 2022, in the Room No.213, AECS Lab, Block-I, H&S department, CMR College of Engineering and Technology, Kandlakoya (v), Hyderabad and discussed the course structure and detailed syllabus for all branches of I B.Tech I & II SEM (R22) courses offered by Department of Chemistry. The following members have attended the meeting.

BOS Members

S.No	Name of the BOS Member	Designation	Representative in BOS
1	Dr. K. Soujanya	Assoc. Prof. & HOD, Dept. Of Chemistry, CMRCET, Hyd.	Chairman
2	Dr. K. Vidya	Assistant Professor JNTUH, University College of Eng., Jagityal	University Nominee
3	Dr. G. Raghava Rao	Director, Madin Life Sciences Pvt. Ltd., IDA Mallapur, Hyd.	Expert from Industry/R&D
4	Dr. Someshwar Pola	Department of Chemistry, Osmania University, Hyderabad	Academic Expert-1
5	Dr. K. Venkateshwar Reddy	Professor, CMR Engineering College, Hyderabad	Academic Expert-2

6	Dr. M. Ravi Kumar	Assistant Professor, CMRCET, Hyd.	Internal BOS member
7	Ms. J. Saroja	Assistant Professor, CMRCET, Hyd	Internal BOS member
8	Lt. D. Divya	Assistant Professor, CMRCET, Hyd	Internal BOS member

Minutes of Meeting:

Time	Minutes	Topic/Discussion	Facilitator
02:00	10	Welcome Address	Dr. M. Ravi Kumar
02:10	15	Introduction Speech	Dr. K. Soujanya
02:25	35	Discussion about R-22 Syllabus framing by University Nominee	Dr. K. Vidya
03:00	30	R-22 syllabus framing discussion by Academic Expert-1	Dr. Someshwar Pola
03:30	20	R-22 syllabus framing discussion by Expert from Industry/R&D	Dr. G. Raghava Rao
03:50	10	R-22 syllabus framing discussion by Academic Expert-2	Dr. K. Venkateshwar Reddy
04:10	10	Vote of thanks	Ms. J. Saroja & Ms. D. Divya
04:20		End of meeting	

Resolutions:

After the thorough discussions, the following points are resolved unanimously.

The BOS Committee members discussed and resolved the following items:

1. Course structure for UG Programme (B.Tech)
 - The Course structure was approved by all the members of BOS with 60% External and 40% internal marks.
2. Syllabus for the Courses offered in I and II Semesters of B.Tech programme.

(i) Engineering Chemistry

Discussed and made Engineering Chemistry as common to all branches.

With the Suggestions of members of BOS, we did the following modifications

1. Introduced electrochemistry, batteries and corrosion as Unit-I instead of M.O.T. & C.F.T. in Unit-1. Advanced Solar Cells topic is included.

2. Unit-2 is modified as Material Chemistry – High Polymers
3. In Unit -3, Spectroscopy Techniques is removed and Energy Sources is introduced
4. New topics are introduced in Unit-5 as Engineering Materials in place of Stereochemistry and Organic reaction mechanism

(ii) Chemistry Lab

Discussed and made Chemistry Lab common to all branches.

With the Suggestions of members of BOS, we did the following modifications

1. New topics introduced as virtual lab experiments.
2. In potentiometric titrations, weak acid vs weak base experiment is replaced with weak acid vs strong base
3. Introduced new experiment, potentiometric titration of Ferrous Ammonium Sulphate (FAS) vs Potassium Dichromate
4. Introduced Thiokol Rubber in place of paracetamol and aspirin
5. Estimation of Iodine by table salt is modified to perform using potentiometric method

(iii) Environmental Studies

Discussed and made Environmental Studies as common to all branches. R-22 syllabus is same as R-18 for this course.

By taking consideration of the above-mentioned modifications, the member of BOS has approved the Syllabus for Engineering Chemistry, Applied Chemistry, Chemistry Lab, Environmental Studies.

3. The BOS Chairman is authorized to modify/change, if any, in the course structure & syllabi.

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D. Dey
K. L. Das
R. K.

(A400009) Engineering Chemistry
(Common to Civil & Mechanical)

B. Tech

L	T	P	C
3	1	0	4

UNIT-I: Electrochemistry, Batteries and Corrosion

Electrochemistry: Electrode potential, Standard electrode potential, Electrochemical cell and E.M.F of the cell, Nernst equation- derivation and applications, Types of electrodes- Quinhydrone electrode, Calomel electrode and Glass electrode. Electro chemical series and its applications. **Batteries-** primary (Lithium cell), secondary (Lead acid storage battery and Lithium-ion battery) and Fuel cells (H_2-O_2 and methanol-oxygen).

Corrosion: Introduction, Definition, Causes and effects of corrosion, Theories of chemical and electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion- Galvanic, Waterline and Pitting corrosion, Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection, Sacrificial anode and Impressed current cathodic methods, Surface coatings- Metallic coatings, hot dipping, galvanizing and tinning, Electroplating- Copper plating and electrolessplating - Nickel plating. Solar cells - Introduction and applications of Solar cells.

UNIT-II: Material Chemistry - High Polymers

Types of polymerizations (addition, condensation and copolymerization).

Plastics: Thermoplastic and Thermosetting resins, Compounding and fabrication of plastics (compression and injection moulding). Preparation, properties, Engineering applications of PVC, Teflon and Bakelite.

Fibers: Characteristics of fibers - preparation, properties and uses of Nylon-6,6 and Dacron, Fiber Reinforced Plastics (FRP) - applications.

Rubbers: Natural rubber and its vulcanization. Elastomers: Buna-s, Butyl rubber and Thiokol rubber.

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

Biodegradable polymers: Preparation and applications of Polyvinyl acetate, Polylactic acid and poly vinyl alcohol.

UNIT-III: Energy Sources: Introduction, Calorific value of fuel – HCV, LCV- Dulong's 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-IV: Water Technology: Sources of water, Impurities in water, Hardness of water, Temporary and permanent hardness, Units of hardness, Estimation of temporary and permanent hardness of water, EDTA method, Numerical problems, Potable water Treatment-Specifications, Steps involved in Treatment-Sedimentation, Coagulation, Filtration, Sterilization, Desalination of Brackish Water, Reverse Osmosis and Electro dialysis.

Industrial water treatment, Boiler Troubles-Scales and sludges, Caustic embrittlement, Boiler corrosion, Priming and foaming. Hot lime and cold lime soda Process-Numerical problems, Zeolite process and Ion exchange process. Internal conditioning methods like Phosphate, Carbonate, Calgon and Colloidal conditioning.

UNIT-V: Engineering Materials:

Cement: Portland cement, its composition, setting and hardening. Smart materials and their engineering applications Advanced Glass Technology: Structure and nature of glasses, transformation range behaviour, dependence of physico-chemical characteristic of glasses on their constituents. Strength of glass and glass articles.

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 (1st edition), B. Rama Devi & Ch. Venkata Ramana Reddy; Cengage Learning, 2012.
2. Engineering Chemistry (1st edition), P. C. Jain and M. Jain, Dhanapat Rai & Sons.
3. Engineering chemistry (1st edition), Dr. Bharathikumari, Dr. Jyotsna.
4. Engineering chemistry (1st edition), Thirumala chary, E. Laxminarayana, SCITECH Publications (India) Pvt. Ltd.

Vidya

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Reference Books:

1. Engineering Chemistry (2nd edition), Shikha Agarwal; Cambridge University Press, 2015.
2. Engineering Chemistry (2nd edition), Wiley India Pvt. Ltd., Vairam and others, 2014.
3. Engineering Chemistry (1st edition), Prasanth Rath, Cengage Learning, 2015.
4. Applied Chemistry (1st edition), H.D. Gesser, Springer Publishers.
5. Engineering Chemistry (3rd edition), B. Siva Shankar, Tata Mc Graw Hill Publishing Limited, 2015.
6. Text of Engineering Chemistry (12th edition), S. S. Dara, Mukkanti, S. Chand & Co, New Delhi, 2006.
7. Chemistry of Engineering Materials (5th edition), C. V. Agarwal, C. P. Murthy, A. Naidu, Wiley India, 2013.
8. Chemistry of Engineering Materials (3rd edition), R. P. Mani, K. N. Mishra, Cengage Learning, 2015

Course Outcomes:

After completion of the course students will be able to

1. Apply the concept of electrochemistry and corrosion science in various practical applications.
2. Predict the different engineering applications by preparing various polymers.
3. Summarize the manufacturing process of various fuels and their applications in daily life.
4. Understand the benefits of treated water as source in steam generation in industrial application.
5. Illustrate the importance and applications of various advanced engineering materials.

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ENVIRONMENTAL SCIENCES (Common to All Branches)

CODE: A400701

L	T	P	C
2	0	0	0

UNIT-I

Environmental Studies: Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems, Bio-geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources: Classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation.

Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Bio-diversity and its conservation, Value of bio-diversity-consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity– In-situ and Ex-situ conservation.

UNIT-IV

Environmental Pollution–Local and Global Issues, Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion, Environmental case studies.

UNIT-V

Environmental Problems in India, Drinking water, sanitation and public health, Effects of the activities on the quality of environment, Water scarcity and groundwater depletion, Controversies on major dams – resettlement and rehabilitation of people: problems and concerns, Rain water harvesting, cloud seeding and watershed management. Economy and Environment, The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practices, Limits to growth, Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

Text Books

1. Environmental Science (1st edition), Y. Anjaneyulu, B S Publications.
2. Environmental studies (1st edition), Deekshadave, Cengage learning India Pvt. Ltd.

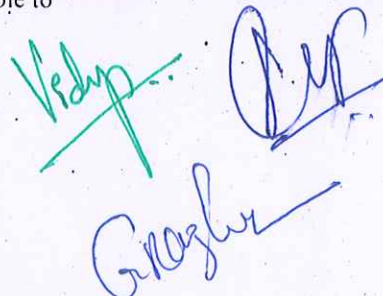
Reference books

1. Environmental sciences and Engineering (1st edition), P. Venugopal Rao, PHI learning Pvt. Ltd.,
2. Environmental Science and Technology (1st edition), M. Anji Reddy, B S Publications.
3. Clark, R.S., Marine Pollution, Clarendon Press, Oxford, 2002.
4. Environmental Encyclopedia (Cunningham, W.P., et al., Jaico Publishing House, Mumbai, 2003.

Course Outcomes:

On successful completion of this course, it is expected that students should be able to

1. Acquire the knowledge on environmental science
2. Acquire the knowledge of various natural resources
3. Understand the importance of conservation and preserve the biodiversity
4. Understand the hazardous effects of environmental pollution
5. Develop skills in understanding various environmental problems



CHEMISTRY LAB
(Common to all branches)

CODE: A400502

L	T	P	C
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		2	1

Lab Experiments:

1. Estimation of Hardness of water by EDTA method.
2. Estimation of Alkalinity of water.
3. Estimation of Copper by Colorimetric Method.
4. Conductometric Titration of a strong acid vs a strong base.
5. Conductometric Titration of a weak acid vs a strong base.
6. Potentiometric Titration of a strong acid vs a strong base.
7. Potentiometric Titration of Ferrous ammonium sulphate (FAS) vs Potassium dichromate.
8. Preparation of Thiokol Rubber.
9. Determination of Viscosity of a Liquid.
10. Determination of Surface Tension of a liquid.
11. Adsorption of acetic acid on Activated charcoal.
12. Estimation of iodine in table salt (by potentiometric)
13. Thin Layer Chromatography (Ortho-Nitro phenol & Para-Nitro phenol).
14. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.

Virtual lab experiments:

1. Construction of Fuel cell and its working.
2. Smart materials for biomedical applications.
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

Reference Books:

1. Engineering Chemistry Lab Manual (1st edition), Glaze Publishers 2018.
2. Engineering chemistry (1st edition), B. Rama Devi & Ch. Venkata Ramana Reddy; Cengage Learning, 2012.
3. A Textbook of Engineering Chemistry (1st edition), Sashi Chawla, Dhanapath Rai & Sons.

Course Outcomes:

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

1. Determine the extent of hardness present in water and its consequences in industrial operations
2. Prepare polymer like Thiokol Rubber
3. Estimate the strength of solutions, p^H of various solutions
4. Determine the viscosity and surface tension of various liquids
5. Apply the electrochemical concepts in conductometric and potentiometric titrations

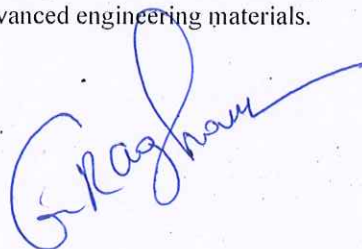
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(A400009) Engineering Chemistry

(Common to Civil & Mechanical)

All Branches

B. Tech

L	T	P	C
3	1	0	4

UNIT-I: Electrochemistry, Batteries and Corrosion

Electrochemistry: Electrode potential, Standard electrode potential and E.M.F of the cell. Electrochemical cell, Nernst equation- derivation and applications, Types of electrodes- Quinhydrone electrode, Calomel electrode and Glass electrode. Electro chemical series and its applications. **Batteries-** primary (Lithium cell), secondary (Lead acid storage battery and Lithium-ion battery) and Fuel cells (H_2-O_2 and methanol-oxygen).

Corrosion: Introduction, Definition, Causes and effects of corrosion, Theories of chemical and electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion- Galvanic, Waterline and Pitting corrosion, Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection, Sacrificial anode and Impressed current cathodic methods, Surface coatings- Metallic coatings, hot dipping, galvanizing and tinning, Electroplating- Copper plating and electrolessplating - Nickel plating. Solar cells - Introduction and applications of Solar cells.

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UNIT-IV: Water Technology: Sources of water, Impurities in water, Hardness of water, Temporary and permanent hardness, Units of hardness. Estimation of temporary and permanent hardness of water, EDTA method, Numerical problems, Potable water Treatment-Specifications, Steps involved in Treatment-Sedimentation, Coagulation, Filtration, Sterilization, Desalination of Brackish Water, Reverse Osmosis and Electro dialysis.

Industrial water treatment, Boiler Troubles-Scales and sludges, Caustic embrittlement, Boiler corrosion, Priming and foaming. Hot lime and cold lime soda Process-Numerical problems, Zeolite process and Ion exchange process. Internal conditioning methods like Phosphate, Carbonate, Calgon and Colloidal conditioning.

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Smart materials: Smart materials and their engineering applications

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4. Engineering chemistry (1st edition), Thirumala chary, E. Laxmiyarana, SCITECH Publications (India) Pvt. Ltd.

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