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2014-15

VASAVI COLLEGE OF ENGINEERING

9-5-81, Ibrahimbagh, Hyderabad, Telangana -500031

DEPARTMENT OF CHEMISTRY

ENGINEERING CHEMISTRY-I

(Common to all branches of B. E.I year)

SYLLABUS FOR THE SEMESTER-I

Instruction : 3 periods per week	Semester En	nd Exam Marks : 70	Subject Reference Code	: CH1130
Credits : 3	Sessional Ma	arks : 30	Duration of semester End Exam	: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	At the end of the course students should be able to:
 Describe the requirements of water for domestic and industrial uses. Discuss different types of polymers with their applications Explain the properties of new materials like composites and conducting polymers. Derive the conditions required for spontaneous process and efficiency of heat engine Emphasize upon the quantity and quality of fossil fuels and need for bio- diesel 	 Select suitable method of water treatment for specific purpose Choose the appropriate polymer as per requirement Able to identify the materials that are used in a wide range of modern -technology Apply the principles of thermodynamics for feasibility and improving the efficiency optimize the use of fossil fuels and focus on eco friendly and renewable fuels.

UNIT-I: Water Chemistry (8)

Hardness of water- Types and its units (PPM, Clarks & French). Degree of hardness-numericals. Determination of hardness of water by EDTA method -numericals. Alkalinity of water and its determination-numericals. Effects of hardness in boilers- scales, sludge, causes and their prevention by Calgon & blow down processes. Softening of water by Reverse Osmosis. Characteristics of potable water , sterilization –Break point chlorination.

UNIT-II: Polymers (8)

Definition, Homo and Co-polymers, Homo chain and Hetero chain polymers. Addition and Condensation polymerization (no mechanisms). Plastics , Elastomers, fibers, Thermoplastics & Thermosets.

Preparation, Properties and Uses of A) Aramid, B) Bakelite, C) PVC (Plasticized & Unplasticized).

Natural rubber- structure - Vulcanization.

Preparation, Properties and uses of Buna-S, Butyl and Silicone rubbers,

Concept of Biodegradable polymers-poly lactic acid.

UNIT-III: Chemistry of Engineering Materials (6)

a) Conducting polymers

Definition, Classification into extrinsic and intrinsic polymers. Mechanism of conduction in doped and undoped polyacetylene & Polyaniline - Applications.

b) Composite materials

Introduction, characteristics and constituents of composites. Classifications of composites(both matrix and dispersed medium). Reinforced composites-A)Glass B) Carbon & C) Aramid Fibre Reinforced composites-Applications of Reinforced composites.

UNIT-IV: Thermodynamics (10)

Introduction –Thermodynamic processes, Reversible & irreversible processes. First Law of thermodynamics - statements and its Limitations, spontaneous and non spontaneous processes. Heat engine & its efficiency. Carnot cycle - efficiency derivation, Carnot theorem. Concept of entropy, physical significance, Entropy changes in reversible & irreversible processes, criteria for spontaneity in terms of entropy. Statements of 2nd Law of thermodynamics. Concept of free energy - criteria for spontaneity in terms of free energy, Variation of free energy with temperature and pressure. Gibbs – Helmholtz equation and its applications - Numericals.

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UNIT-V: Chemical Fuels (10)

Introduction, Classification, requisities of a good fuel. Calorific value (CV)-HCV, LCV(Defination and relationship), Dulongs formula-Numericals.

Solid Fuels: Coal- Significance of Proximate & Ultimate analysis.

Liquid Fuels: composition and CV of Gasoline, Fixed bed catalytic cracking method, Knocking and its significance-, Octane number, Enhancement of quality of gasoline (removal of S, anti knocking agents-leaded & unleaded petrol). Catalytic converters and their role in reducing the toxicity of exhaust emissions. Diesel-composition, CV, Cetane number.

Gas Fuels: Composition and applications of CNG, LPG.

Bio-diesel: Source and Transesterification.

Learning resources:

1. Elements of Physical Chemistry by S. Glasstone and D Lewis

2. Textbook of Polymer Science by Fred W. Billmeyer Jr.

3. Principles of physical chemistry by Puri, Sharma and Pathania.

4. Text book of physical chemistry by PLSoni and op Dharmarha, s Chand &sons, new Deihi.

5. Engineering chemistry by PC Jain, M Jain Dhanpat Rai &sons (15th edition), New Delhi

6. Engineering chemistry by Sashi Chawla, Dhanpat Rai &sons, New Delhi.

7. Engineering chemistry by O.G. PALANNA, tmh, and Newdelhi

8. Chemistry in engineering and technology by JC Kuriacose and J Rajaram TMH, and New Delhi

9. Engineering chemistry by SS Dara, S Chand &sons, New Delhi.

10. Wikipedia

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VASAVI COLLEGE OF ENGINEERING

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DEPARTMENT OF CHEMISTRY

CHEMISTRY LABORATORY -I (Common to all branches of B. E.I year)

SYLLABUS FOR THE SEMESTER-I

Instruction : 3 periods per week	Semester End Exam Marks : 50	Subject Reference Code	: CH1131
Credits : 2	Sessional Marks : 25	Duration of semester End Exam	: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES		
The course will enable the students to:	At the end of the course students should be able to:		
 Describe the quantitative analytical techniques Learn the skills to handle the instruments Apply the theoretical principles in experiments Demonstrate the preparation of polymers Examine the accuracy 	 Analyze the given substance using conventional and instrumental volumetric techniques Estimate the substances by conductometry and colorimetry Evaluate the data from the practical observations Prepare urea- formaldehyde and nylon 6,6 polymers Calculate the percentage of error of the results obtained 		

Any EIGHT experiments

S. No.	Experiment
1	Introduction – weighing demo
2	Preparation of standard solution
3	Estimation of Ferrous by permanganometry
4	Estimation of total hardness by EDTA
5	Estimation of Carbonate and bi carbonate
6	Determination of Parameters of Water
	Conductometry
7	Strong acid vs strong base
8	weak acid vs strong base
9	Mixture of acids vs strong base
	Colorimetry
10	Verification of Beer- Lamberts law & Determination of concentration of K ₂ Cr ₂ O ₇
11	Verification of Beer- Lamberts law & Determination of concentration of $KMnO_4$
12	Preparation of Poly Pyrrole /Urea formaldehyde & Nylon 6.6 (Demo)

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