

SECOND SEMESTER

CY202: Engineering Chemistry-II

Subject: Engineering Chemistry-II

Code: CY202

L-T-P-C: 3-1-0-3/week

Class hours: 4 hours/week

Total no. of classes: 40(approx)

L: Lectures T:Tutorials P:Practicals C:credits

Course content:

Unit I: Instrumental Methods of Chemical Analysis (Mark=20)

Data analysis: Types of errors, accuracy and precision, statistical tests of data-the F test and the T test, propagation of errors, significant figures.

Spectroscopy: Principles of spectroscopy, the electromagnetic spectrum, absorption and emission of radiation, Spectral width and intensity.

Electronic (UV-Vis) Spectroscopy: The Beer-Lambert law of absorption, types of electronic transitions - $n \rightarrow \pi^*$, $\pi \rightarrow \pi^*$, d-d, and charge-transfer, selection rules for electronic transitions, applications of electronic spectroscopy.

Infrared Spectroscopy: Molecular vibrations, vibrational spectrum, applications

NMR Spectroscopy: Basics and applications, brief introduction to MRI

Flame photometry: Theoretical principles, emission spectra, instrumentation, experimental procedure, applications.

Atomic absorption spectroscopy: Introduction, principles, applications

Electrochemical methods of analysis: Cyclic voltametry

Chromatography: Introduction to different types of chromatographic techniques

Introduction to Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM)

Unit II: Nanochemistry (Mark=10)

Definition of nanomaterials and nanotechnology, Nanostructures in nature, Quantum structures, Quantum confinement, Surface effects of nanomaterials, Properties and Synthesis of nanomaterials(brief ideas only), Nanocomposites, Applications of nanomaterials

Unit III: Catalysis and Catalytic materials (Mark=20)

Homogenous and heterogenous catalysis, supported and unsupported metal catalysts, applications of zeolites and clays as heterogenous catalysts, manufacture and transformation of hydrocarbons- hydrogenation and isomerization of olefins, oxidation of olefins by Wacker process, catalyst for control of pollution from automobile exhaust, nano catalyst.

Co-ordination compounds, their role in catalysis and other applications.

Unit IV: Non-Conventional Sources of Energy (Mark=15)

Biofuels: Alcohol, hydrogen production technology, biofuels from Jatropha

Green Energy : Sources, efficiency and sustainability, energy from biomass and solid waste.

Renewable energy sources: solar, hydropower, wind energy.

Unit V: Cosmetics and Textile Chemistry (Mark=10)

Cosmetics: Introduction, types, chemical composition, merits and demerits, applications.

Textile chemistry: Natural and added impurities in textiles, Natural impurities in cotton, wood and silk. Chemistry of sizing agents, Mercerization and optical whitening of cotton. Chemistry and application of optical whitening agents

Unit VI: Medicinal chemistry (Mark=10)

Definition of drug. Factors affecting their bioactivity. Theoretical aspects of drug receptor interaction, QSAR, Lead compounds, Elementary idea of molecular modelling of drugs.

Sulpha-drugs: Historical significance of sulpha-drugs, Introduction to sulphanilamide and other important sulpha-drugs. Mode of action of sulpha-drugs

Drugs for the treatment of cancer and AIDS

Unit VII: Advanced Materials Chemistry (Mark=5)

Brief introduction to Optical fibres, LCD, LED.

Unit VIII: Industrial Chemistry (Mark=10)

Brief introduction to cement, ceramics, refractories, lubricants, soap and detergents, fats and oils, dyes and pigments, adhesives, etc.

Text Books/Reference books:

1. Principles of Instrumental Analysis-D.A.Skoog and J.L.Loary, W.B.Saunders
2. Inorganic chemistry-Shriver,Atkins,Langford (ELBS)
3. Medicinal Chemistry-A.Kar(New Age International)
- 4.Nanomaterials-B.Viswanathan(Narosa Publishing House)
- 5.Fundamentals of Molecular Spectroscopy-Banwell & McCrash (Tata McGraw Hill)
6. Medicinal Chemistry-An introduction-Gareth Thomas(John Wiley & Sons)
7. Homogenous catalysis-Parshall and Ittel(Wiley)
- 8.Heterogenous catalysis-principles and applications- G.C.Bond
9. Catalysis-Science and Technology-J.R.anderson and M.Boudart
10. Food Chemistry-Chopra and Panesar(Narosa Publishing House)
11. Cosmetic Chemistry I by Dr. Kulkarni (Denett Publications)
12. Cosmetic Science and Technology Vol. I, II, III by Sagarin