Chemistry

1. Water Technology :

Introduction, sources of water Impurities in water, hard and soft water, Degree of hardness, Types of hardness, Scale and sludge formation in boiler Boiler corrosion. Caustic embrittlements, Priming and Foaming, Softening of water. Potable water, Break point of chlorination, Desalination of Brackish water etc.

2. Metals and alloys :

Introduction, Physical properties of metals, cast iron, wrought iron, steel, Heat treatment of steel. Definition of alloy, purpose of making alloys. Classification of alloys. Alloys of steel and its applications. Non-Ferrous alloys and its industrial applications.

3. Corrosion and its inhibition :

Introduction, Theories of corrosion, Types of corrosion, Protection of metals from corrosion – organic and inorganic materials, Inhibitors, Cathodic protection.

4. Fuels and Combustion :

Definition, types of fuel – solids, liquids, gaseous and Nucleon fuels. Calorifio Value, Characteristics of good fuel. Solid fuels – coal, coke. Analysis of coal – ultimate and proximate Liquid fuel – Petroleum. Refining of Petroleum by Fractional distillation. Gaseous fuel – coal-gas, bio gas produces gas and water gas. L.P.G. & CNG.

5. Lubricants :

Definition : Types of lubrication, classification of lubricants and their properties. Functions of lubricants.

6. Cements :

Introduction Manufacturing of Lime, Gypsum and Cement and their properties. Manufacturing of Portland cement, chemical composition of cement chemical constituents of Portland cement, Setting and hardening of cement.

7. Polymers and Plastics :

Introduction, Definition of Polymer. Types of Polymers, Types of Polymerization reactions and their mechanism. Plastics, Classification of plastics – Thermo plastics and Thermo setting plastics. Molding constituents of plastics Engineering properties and uses of plastics.

Definition of Rubber, Types of Rubber, Vulcanization of rubber. Application of Rubber.

8. Multidisciplinary nature of Environment Study :

Introduction, Nature of environment and its problem due to over utilization of natural sources. Environmental degradation Green house effect, acid rain, Ozone depletion, Photochemical smog. Environmental problems in India, Environment management and laws. Public awareness.

9. Natural and Synthetic Fibers :

Introduction Definition of Fiber, Types of fibers – Natural, semi synthetic, synthetic fibers. Physical properties of fibers. Essential requirement for fiber for formation. Preparation, properties and uses of Cellulose acetic, Viscose Rayon, Nylon, Polyesters acrylic, Glass fibers etc. Differentiate between wool and silk fibers. Spinning processes – Melt and Wet spinning.

10. Chemical aspect of Biotechnology :

Definition, Benefits through biotechnology – Agriculture, Food quality, Medicines etc. Fermentation, Fermentation processes, Enzymes and its application in industries. Bio fuels and Bio membrane.

11. Protective Coatings :

Introduction, Types of protective coatings – metallic, chemical, organic, electroplating. Paints and varnishes – Ingredients, properties and uses, Enamels, Lacquers etc.

12. Renewable and Non-renewable energy of sources :

Resources of energy, Appraisal resources problems, classification of Natural and renewable resources. Destruction and Conservation.

13. Refractories, Abrasives and Insulators :

Definitions of refractories, Abrasives and insulators. Properties of refractories. Classification of refractories.

Classification, properties and uses of abrasives. Classification, properties and uses of Insulators.

14. Analytical Techniques :

Introduction Types of analysis – Physical, Chemical and instrumentation.

Physical analysis – Specific gravity, Melting point, Boiling point, Crystallization. Purification of compounds etc. Chemical analysis – Quantitative and Qualitative analysis of organic and inorganic compounds.

Instrumental analysis – Spectroscopic, Chromatographic PH measurement, Conductinity, Turbidity etc.

- The topics No. 12, 13 and 14 are to be taught during practical hours as a part of tutorial.

References :

1. Engineering Chemistry by Jain and Jain Publisher Dhanpat Rai Publishing Co.
2. Engineering Chemistry by Dr. O.P. Agrawal Khanna Publishers Delhi
3. Engineering Chemistry by N. Krishnamurthy, P. Vallinaygam and D. Madhavan Publisher – Prentice – Hall of India Pvt. Ltd. New Delhi
4. Engineering Chemistry by R. Gopalan, D. Venkappaya and Sulochana Nagarjan
5. Engineering Chemistry by C. Parameswara Murthy, C.V. Agrawal and Andra Naidu, B.S. Publication, Hyderabad – A.P.

6. Environmental Science by Y. Anjaneyulu B.S. Publishers, Hyderabad – A.P.
7. Environmental Studies and Disaster Management by S.G. Shah, S.G. Shah and Gopal N.Shah
8. Engineering Chemistry by B. Sivsankar The M.C. Grawhill Companies, New Delhi

Physics

1) Architectural Acoustics
Classification of Sound : Loudness – Weber – Fechner law Decibel – Absorption Coefficient – Reverberation – Saline's formula – Factors affecting acoustics of buildings and their remedies.

2) Ultrasonic
Introduction, production, properties and detection of ultrasonics. Determination of velocity and application of ultrasonic in Engineering.

3) Crystal Physics
Introduction and classification of solids-crystal structure – The crystal systems and Bravias Lattice – Space Lattices of cubic systems – Miller Indices – Relation between Interplanner Distance and cubic Edge and Laws Formula.

4) Band theory of Solids
Based theory of Solids – Classification of solids – Energy band structure of conductors, insulator and semi conductions types of diodes (simple diode, Zener diode, varactor diode, LED Solar cells, photovoltaic cell, Photo Conductivity, Hall effects.

5) LASERS :
Introduction and properties of Lasers, Stimulated and instantaneous emersion – Relation between Ecienstein's 'A' and 'B' Coefficients-Population Inversion – Optical – Pumping – Nd-Yag Laser and CO_2 Laser – Application of Laser in Material Processing – Holography – Application of Lasers

6) Optical – Fibre Communication Introduction – Fibre – Optic System – advantages of Fibre optics – Basic principle – Acceptance angle and Numerical Aperture – Types of optics preparation through optical fibre

7) Conducting Materials :
Introduction – conduction in Metals, Electron theory Q.M. treatment – Free electrode theory of metals – Electrical Conductivity – Thermal Conductivity – Wildemann – Franz law – Drawbacks of classical free electrode theory

8) Super Conducting Materials
Introduction to super conductor – properties of super conductor Type I and Type II super conductor – Comparision between I and II – High T conductors – Application

9) New Engineering Materials
Introduction – Metallic glasses, types, properties, preparation and its application – Introduction to nano technology – method of producing, properties and its application – shape memory alloys – types – shape Memory effect – Pseudo

elasticity – properties – application – Bio-materials – General information – Biomedical compatibly of Ti-Al-Nb alloys for implant application.

10) Non-Destructive Testing
Introduction – The objective of NDT – Types of Defects – Methods of NDT (Liquid Penetrate – Dye Penetrate Radiographic) x X-ray Radiography – X-ray Fluoroscopy – Ultrasonic Inspection method – Pulse Echo System – Visual Display units.

Reference Books :

1) Engineering Physics K. Rajagopal Prentice-Hall of India Pvt. Ltd., New Delhi
2) Engg. Physics G. Vijayakumari Vikas Publishing House Pvt. Ltd.
3) A Text book of Engg. Physics M.N. Aavadhalula P .G. Kshirsagar S. Chand
4) Engg. Physics Abhijit Nayak S.K. Kataria & Sons., Delhi.