

Applied Chemistry – I

F.E. Sem. I

EVALUATION SYSTEM

	Time	Marks
Theory Exam	2 Hrs.	75
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. Polymers :

- Introduction, Classification, Hydrocarbon Molecules, Thermoplastic, Thermosetting Polymers.
- Basic Concepts Molecular Weight, Molecular Shape, Polymer Crystallinity. Crystallization, Melting and Glass Transition Phenomena
- Viscoelasticity, Deformation Fracture, Defects in Polymers.
- Polymerization, Addition, Polymerization, Copolymerization and Condensation Polymerization. Polymer Additives Plastics, Elastomers, Vulcanization.
- Advanced Polymer Material, Conducting Polymers, Electrical Properties of Polymers, Liquid Crystal Properties. Molecular Electronics and Polymers and Supramolecular Chemistry.
- Fabrication of Polymers : (i) Compression Moulding (ii) Injection Moulding (iii) Transfer Moulding (iv) Extrusion Moulding
Synthesis Properties and Uses of PE, PMMA Formaldehyde resin, Polymer Composite Materials.

2. Water :

- Hardness of water, effect of hard water in the manufacture sector, types of hardness, determination of hardness by EDTA method and Problems.
- Softening of water by (i) lime soda method with equations in general. Hot–cold lime soda method and problems (ii) zeolite process and problems (iii) Ion exchange method (iv) reverse osmoses, ultrafiltration and its industrial applications.
- Methods of determine extent of water pollution (i) BOD (ii) COD.
- Methods to control water pollution.
- Industrialisation – materials cycle and pollution. Recycling issues.

3. Lubricants :

- Definition, classification, characteristic properties, problems on acid value and saponification value. Theories of lubrication.
- Additives for lubricants, selection of lubricant.

4. Energy :

- Classification. Solar energy, hydropower, wind power, Bio–mass energy using bio technology, Hydrogen as a fuel.
- Solar energy, Production of electricity using solar energy Rechargeable alkaline storage batteries, Nickel Hydrogen Batteries. Rechargeable Lithium ion batteries.

5. Phase Rule and steels :

- Gibbs Phase Rule, One Component System Water. Two Component system Iron–Carbon Equilibrium Diagram with Microstructures.
 - Limitations and Application of Phase Rule.
 - Plain Carbon Steel. Limitations.
 - Introduction to Alloy Steels, special steels.
 - Principle of shape memory effect and its applications.
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6. Nano-materials :

- Introduction to nano-materials.
- Graphite, fullerenes, carbon nanotubes, nanowires, nanocones, Haeckelites. Their electronic and mechanical properties.
- Production methods for CNTS.
- Applications of nano materials in (i) Medicine (ii) Catalysis (iii) Environmental Technologies (iv) Electronics and related fields. (v) Mechanics.

Reference:

1. Engineering Chemistry – (*Jain & Jain*), Dhanpat Rai.
2. Engineering Chemistry – (*Dara & Dara*), S.Chand
3. Materials Science & Engg. – (*William Callister*)
4. Chemistry of advanced materials – (*CNR Rao*), RSC Pbl.
5. Polymer Chemistry – (*Vasant Gowariker*)
6. Membrane Filtration – (*Gutman*), Adam Hilger Bristol.
7. Nano scopic materials – (*Emil Roduner*), RSC Publishing
8. Nano Chemistry – (*Ozin et. al.*), RSC Publishing
9. Physical Metallurgy – (*B.K.Agarwal*).

