

Chemical, Rubber and Plastic (PAPER -I)

(a) Fundamentals of Chemical Engineering Operations (I)

Properties of fluids, Newtonian and Non-Newtonian fluids, Laminar and turbulent flows, Equation of continuity, Bernoulli's theorem, Free and hindered settling, Flow meters, Pressure drop due to friction, Reynold's Number, Friction factor and pipe roughness, Pumps, Size reduction, Agitation and mixing, Free and hindered settling, Measuring instruments for level, pressure, flow, temperature, concentration. Laws of thermodynamics.

(b) Polymer chemistry

Introduction, Addition polymerization, Step growth polymerization, Solution properties of polymers, Dimensions of Macromolecules

(c) Physical properties of Polymers

States of Aggregation in polymers, Deformation and strength properties of polymers, friction and wear in polymers, Electrical properties of polymers, Optical properties of polymers

(d) Plastic Materials and Properties

Olefinic plastics, Styrenics and Acrylics, PVC technology, Thermosets and natural polymers

(e) Rubber Materials and Compounding additives

Structure-property relationships in rubbers, General purpose rubbers, Special purpose rubbers, Compounding and additives for vulcanization, fillers and other additives

(f) Engineering and High Performance Plastics

Additives for plastics, Engineering plastics, High temperature plastics, Speciality polymers

(g) Plastic Processing and Machinery

Melt processing of plastics, Extrusion process and blow moulding, Injection moulding of plastics, Thermoforming, Rotational moulding and finishing of plastics

(h) Rubber and Plastic Testing

Plastic testing, Test for rubber properties, Destructive and durability test in elastomer

Chemical, Rubber and Plastic (PAPER –II)

(a) Fundamentals of Chemical Engineering Operations (II)

Fundamental laws of conduction, convection and radiation, Co-current and counter current operations, Log mean temperature difference (LMTD), Different heat exchangers and their calculations, Molecular diffusion, Fick's law of diffusion, Mass transfer coefficients, Basics of distillation and extraction, Humidification and dehumidification, Kinetics of chemical reactions, Ideal reactors and their performance equations.

(b) Rubber Processing and Machinery

Compounding and mixing operations, Forming operations, Moulding and other vulcanizing techniques, Finishing of rubber components, Processing methods for various rubber products, safety in rubber machinery.

(c) Plastic and Rubber Mould Die Design and Construction

Design of moulded articles, Principles of operation and design, Mould making, Materials for mould manufacturing, Unconventional machining processes.

(d) Polymer Characterization Techniques

Chemical methods, Spectroscopic characterization, Rheological characterization, Thermal analysis, Chromatographic characterization.

(e) Rubber Compound and Product Design

Designing with rubber, Service conditions, Design for rubber components, Individual rubber formulations, Formulation for performance requirements. Introduction to foam and adhesive technology and applications

(f) Polymer Composites

Introduction to composites, Materials used in polymer composites, Processing method for fiber reinforced plastics (FRP), Testing and characterization of composites, Finishing and application of composites.

(g) Tyre technology

Introduction to tyre technology, Tyre cord and cord reinforced number, Structure of Pneumatic tyre, Tyre stress, Deformation, Tyre traction and wear, Measurement and analysis of tyre properties.

(h) Application, Packaging and Recycling of Polymer and Rubber

Diverse applications of Plastic and rubber products, Introduction to packaging, Packaging materials, Testing of packaging materials, Fundamentals of plastic recycling, Recycling operations and materials for plastics, Rubber recycling

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