

TAMIL NADU PUBLIC SERVICE COMMISSION

SYLLABUS

CHEMICAL ENGINEERING

(P.G. STD)

Code No.179

UNIT-1 **Chemical Operations:**

- Basic concepts of Chemical process calculation – expression of the composition of solution & mixtures – Material balance without Chemical reaction – With reaction – Gas calculations – Energy balance.
- Gas Absorption – Absorption factor – Requirement of solvent - packed tower – Construction details of packed tower – Characteristics of packing materials – Type of Packing – HETP, HTU & NTU concepts.
- Diffusion – Molecular & eddy diffusion in fluids – Fick's laws of diffusion – Maxwell's law of diffusion – Diffusivity & its measurement – Steady state diffusion under stagnant & laminar flow condition – Diffusion in solids such as porous solids, crystalline solids & polymers.
- Humidification – Types of Humidity – Glossary of terms in Humidification dry & wet bulb temperatures - Humidity chart Types of Humidities - Humidity measurement by chemical method, Hygrometer, Psychrometer & dew point method.

UNIT-2 **Corrosion Engineering**

- Corrosion – classification – Mechanism of specific types of corrosion – prevention and control of corrosion by selection of materials, modification of design & protective coatings – Electro plating – cladding – Flame spraying –Plasma spray coating – Hot dipping – Electro chemical/Electrolytic reduction methods – Ion implementation – Diffusion – surface modification.

UNIT-3 **Surface Coating Process**

- Surface coating – preparing cementations, wood & metal surfaces cleaning by chemical treatment & sand blasting – application of coating – coating with brush, spray guns – air, airless & electrostatic spraying – fluidized bed coating – electron beam radiation curing – Hot phosphating – mictation process – Robotic painting – Powder coating – water based coating – mechanism of film forming – drying of coating.

- Paints – constituents of paints – paint manufacturing procedure – pigments & their types – Enamels – Lacquers – varnish –dyes.

UNIT-4 **Engineering Materials**

- Metals and their alloys such as Iron, Steel, Lead, Copper, Nickel, Zinc, Tin, Aluminum and Magnesium – their chemical, Mechanical & other properties – Metallic glasses – Metallic composites – cermets – Reinforced materials.
- Non metals – Ceramics – classification & structure of ceramics – properties & application of ceramics – clay bodies – Refractories Abrasives – Wood - Preservation of wood by chemicals, Impregnation with wax and plastics, Fire retardant treatment – Glass – their composition & classification – Manufacturing procedure of glass.
- Cement – types – composition & characteristics – manufacturing procedure – chemistry of setting & hardening – Grading of cement special cements.

UNIT-5 **Polymers and Adhesives**

- Polymers – Degree of polymerization – Mechanisms of Polymerization – structure & application of polymers – Plastics – Thermoplastics & Thermo setting plastics – Rubber & elastomers.
- Adhesives – natural, synthetic, reactive & non – reactive – Characteristics of Epoxies - Urethanes – Poly vinyl alcohol & poly vinyl acetate – applications – surface preparation – Joint design, mechanism and theories of adhesion.

UNIT-6 **Air Pollution**

- Air Pollution – sources, effects and measurements – Particulates and gaseous pollutants – Analysis of air pollutants – control methods of gaseous pollutants – control of particulates by equipments such as Cyclone separator, Gravitational settling chamber, Fabric filters, Wet scrubbers and Electrostatic precipitators – Design aspects of Wet scrubbers.