

Department of Oils, Oleochemicals and Surfactants Technology

Syllabus for Ph. D. Tech. (Oils) Entrance examination

Advanced Chemistry of Oils and Fats: Physical properties of fatty acids and their esters. Polymorphism and crystal structure, solubility and miscibility, refractive index and molecular refraction, adsorption spectra, electrical properties, Advance instrumental techniques used for analysis oils and fats (GC, HPLC, HPTLC, GPC, FTIR, NMR, GC-MS, LC-MS etc.), Theories of glycerides structure, effect of fatty acid distribution on physical properties, genetic modifications of oils and fats, Blending of oils. Adulteration tests for oils and fats. Novel methods of vegetable oil processing.

Non-traditional oils and fats and waxes : Neem, karanja, jatropha, mahua, pisa, kokum, sal, mango kernel etc. Processing of tree borne oilseeds. Non-triglyceride constituents: separation, isolation and utilization. Separation, characterization and applications of byproducts of vegetable oil industry, Occurrence, production, properties and utilization of various waxes such as carnauba wax, rice bran wax bees wax, wool wax, jojoba oil, spermaceti wax etc.

Oleochemicals: High pressure fat splitting. Separation methods used for fatty acids. Reactions and fatty acids and its applications in chemical industries, Different techniques of synthesis of Fatty Acid Methyl Esters (FAME), Glycerol and Fatty Alcohols, Fatty Amines, Amides, and Nitriles and their physical and chemical characteristics, Different Oleochemicals from Castor oil, Value addition of glycerin obtained from biodiesel industry,

Surfactants, and Detergents: Design of Sulphonation and Sulphation processes, new generation surfactants such as Fluorinated, Gemini, silicone, sugar based and polymeric surfactants. Aggregation properties of Surfactants

Detergents formulations and auxiliary chemicals/ builders/fillers/ specialty chemicals used in detergent industry, Application of soaps, surfactants and detergents in food, pharmaceuticals, textile, leather, surface coating, adhesives and other industries

Perfumery chemicals and Cosmetics :Methods of extraction of essential oils and analysis of essential oils. Synthetic perfumery chemicals.

Formulations, manufacture and characteristics of Lipstick, Toothpaste, Mouthwash, Shaving cream, After shave lotion, Cleansing milk, Face scrub, Vanishing cream, Eye shadow, Nail polish, shampoo and hair dyes.

Functional Fluids: Fundamentals of Friction, Wear & Lubrication, Hydrodynamic & Elasto hydrodynamic lubrication, boundary lubrication, viscosity, viscosity index. Functions and applications of Lubricants, Performance, quality & viscosity of lubes. Comparison between solid, semisolid, liquid and gaseous lubricants, types, classification, raw material, manufacturing process, specifications and applications of greases, sulfochlorinated and sulfurised compounds, polymers, phosphate esters as extreme pressure, antiwear, pour point depressant, viscosity index improvers, multifunctional additives: Synthesis, properties and applications.

Chemical Engineering: Fundamentals of Heat, Mass and Momentum Transfer, Process Calculations and Unit operations in Chemical Industries (drying, evaporation, distillation,

extraction, adsorption, membrane separations etc.), Design of Packed Bed, Slurry, Trickle Bed, Moving Bed Reactors.

Environmental and pollution control in oils, oleochemical and surfactant industries:
Byproducts utilization and waste management, Disposal and utilization of by-products from oil processing industries: gums, soap-stock, acid oil, spent bleaching earth, deodorizer distillates and fatty acid distillates, spent nickel catalyst, glycerin and fatty acid distillation residues/pitch