SYLLABUS FOR ENTRANCE TEST

Ph.D IN SUGART TECHNOLOGY

Unit 1

Sugarcane: origin, distribution of cane, major sugarcane producing countries, sugarcane cultivation and sugar production in India, Sugarcane: taxanomy and anatomy - stem, leaves, root system & the flower, cultivation practices; Preparation of land, period of sowing, planting, irrigation, fertilizer application, growth and maturity of crop, weeds, pests and deceases.

Unit 2

Non Sugars in Cane: Proteins and Amino Acids in cane and their role in processing, Non nitrogenous organic acids in cane and that formed during processing, nonsugars of high molecular weight (cellulose, lignin, pectin, starch), sugarcane wax and fatty lipids and their significance in processing. Inorganic non sugars in cane and their role in processing.

Unit 3

Colouring Compounds: Originally present in cane (chlorophyll, xanthophyll, carotene, anthocyanin) and which develop colour (polyphenols and amino compounds), coloured sugar decomposition products, measurement of color, colour removal by active carbons and ion exchange resins

Unit 4

Properties of Sucrose: Structure and Synthesis, hydrolysis, oxidation and reduction, alkaline and thermal degradation, solubility, density, viscosity, rotation of polarized light, electrical properties. Reducing Sugars: Physical and chemical properties, alkaline and acid decomposition reactions.

Unit 5

Cane Juice Clarification: reactions of clarification – formation and removal of various calcium compounds by liming & sulphitation, physical chemistry of clarification – coarsely suspended matter, Colloids: Types and properties of colloids, isoelectric point, zeta potential, colloids in cane juice, elimination of colloids in clarification process. Floc formation, physical reactions of flocculation, conditioning and subsidation. Factors affecting the clarification of juice.

Unit 6

Crystallization: effect of concentration, temperature, & stirring on rate of crystallisation, mechanism of crystal growth - diffusion, viscosity, colloids, crystallographic considerations. Decomposition of Sucrose and reducing sugars, solubility & supersaturation, nucleation and massecuite boiling schemes, crystallisation by cooling.

Unit 7

Evaporation: Formation of steam, total heat of water; latent heat and sensible heat; wet, dry saturated & superheated steam, de-superheated exhaust steam for evaporation, single effect evaporator, Rellieux's Principles, multiple effect evaporators - operation and working of quintuple effect evaporator, rising and falling film evaporators, factors affecting efficiency of evaporators.

Unit 8

Optical methods of sugar analysis: Optical Activity, specific rotation of sugars, principle of polarimetry, international sugar scale, normal weight of sugar; methods of simple polarization, Brix, Pol & Purity, spectrophotometric methods, sugar colour by ICUMSA

Unit 9

General characteristics of micro-organisms, growth, sterilization and disinfection; Brief study on Lactic acid bacteria and *Leuconostoc mesenteroides* and their significance in Sugar Industry. Microbial contamination in sugar factory - control methods, effect of dextran on sugar processing & its removal.

Unit 10

Water Treatment: Dissolved impurities in water, demineralisation, water treatment and water conditioning for boiler feed, Quality of feed water for high pressure boilers. **Waste Water Treatment**: Treatment of sugar factory and distillery effluents, norms of various constituents.

Corrosion: types, theories, effect of pH, nature of metal and dissolved oxygen on corrosion, corrosion inhibition, corrosion in a sugar factory.