

THESIS OF **UNIT OPERATIONS** FOR FINAL BSC EXAM
Academic year 2022/2023

1. Transport of Fluids through Pipes. Types of Pumps.
(Mass- and energy balances for real fluids. Interpretation of the Re number, flow ranges. Moody diagram. Equivalent diameter and equivalent length.)
2. Mixing, homogenization.
(Eu – Re diagram, flow ranges. Interpretation of mixing Re and Fr numbers. Mixer types.)
3. Gravitational and centrifugal sedimentation.
(The Re number of sedimentation, f - Re diagram of sedimentation, flow ranges. Using the Karman chart. Design of a gravity settler. Sedimentation equipments.)
4. Circulation of Fluid through Porous Beds: fluidization. Pneumatic transport.
(Ranges and characterization of pressure drop – fluid velocity diagram. Characterization of packings.)
5. Filtration, determination of filtration characteristics by experimental way. Filtering equipments.
(Design of Filtration: determining the surface of an industrial filter.)
6. Methods and food industrial application of membrane filtration.
(Membrane filtration operations and their main features. Material, structure and design of the membranes, characteristic parameters and modeling of membrane filtration).
7. Fundamental modes of heat transport. Determination of heat flow rate by heat conduction in different cases. Convective heat transport. (Criteria equation and dimensionless numbers)
8. Overall heat transport. Temperature profiles of co-current and countercurrent operation mode, Logarithmic Mean Temperature Difference.
9. Heat transports with phase change (boiling, condensation). Types of heat exchangers.
(Types and characterisation of condensation, boiling curve, improving of heat transfer coefficient)
10. Mechanical Refrigeration System. Characterisation and requirements of refrigerants. (Plotting of different refrigeration cycles in log p-h diagram. Coefficient of Performance.)
11. Fundamentals of evaporation.
(Construction and working of single effect continuous evaporator. Balance equations. Multiple-effect evaporation. Evaporators.)
12. Fundamentals of Crystallization. Precipitation.
(Crystallization of solvent and solute in temperature – solute concentration diagram. Design and types of crystallizers.)
13. Fundamentals of Distillation. Phase diagrams.
(Continuous and batch distillation, relative volatility, balance equations.)
14. Continuous Rectification. Operation of Rectifying Column.
(Operating lines, determination of Number of Theoretical Stages in Equilibrium diagram. Types of Rectification Columns.)
15. Thermal Drying.
(Mollier diagram. Drying kinetics. Classifications of dryers.)
16. Ideal and nonideal Continuous Drying.
(Ideal, nonideal, recirculated, single-stage, multi-stage. Plotting in Mollier diagram, balance equations. Contact and convective dryers.)
17. Liquid – Liquid Extraction.
(Schematic flow diagram, Solvent Requirements, Extraction variations with balance equations and plotting in the equilateral triangular diagram. L – L extractors.)
18. Solid – Liquid Extraction.
(Schematic flow diagram, Extraction variations with balance equations and plotting in the equilateral triangular diagram. S – L extractors.)