

**UNIT-1****Chapter 1 : Fundamentals of Heat Transfer and Heat Conduction 1-1 to 1-57****Syllabus :**

**Basic concepts :** Different modes and Laws of heat transfer, 3-D heat conduction equation in Cartesian Co-ordinates (with derivation) and its simplified equations in cylindrical and spherical coordinates (Simplified equations, no derivation) thermal conductivity, thermal diffusivity, electrical analogy, Thermal contact Resistance.

**Boundary and initial conditions :** Temperature boundary condition, heat flux boundary condition, convection boundary condition, radiation boundary condition.

**1-D steady state heat conduction without heat generation :** Heat conduction without heat generation in plane wall, composite cylinder, composite sphere.

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**Syllabus :** Heat transfer through extended surfaces: Types of fins and its applications, Governing Equation for constant cross sectional area fins, Solution for infinitely long fin (with derivation), adequately long fin with insulated end tip and short fins (no derivation), Fin Efficiency & Effectiveness of fins, estimation of error in Temperature measurement by thermometer.

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**UNIT-3**

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**Chapter 6 : Convection, Boiling and Condensation 6-1 to 6-81**


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**Syllabus :**

**Principles of Convection :** Local and average heat transfer coefficient, Hydrodynamic and Thermal boundary layer for a flat plate and pipe flow.

**Forced Convection :** Physical significance of non-dimensional numbers, Empirical correlations for flat plate, pipe flow, and flow across cylinders, spheres, tube banks.

**Free Convection :** Physical significance of non-dimensional numbers, Free convection from a vertical, horizontal surface, cylinder and sphere. Mixed Convection

**Boiling and Condensation :** Types of boiling, Regimes of pool boiling, Film wise condensation, Drop wise condensation (No Numerical treatment), Critical heat flux.

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**UNIT-6**

**Chapter 9 : Heat Exchangers & Equipment Design 9-1 to 9-71**

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**Process Equipment Design :** Condenser Design, Introduction to TEMA standards, Design considerations for heat exchangers, Materials of construction and corrosion, Temperature effects, Radiation effects, Economic consideration, Condenser and Heat exchanger design and performance calculations, Design of shell and tube type Heat Exchanger.

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