

Advanced Heat Transfer – I (Conduction and Radiation)

Module I

Conduction; Derivation of generalized conduction equation for anisotropic inhomogeneous solids, conductive tensor, concepts of isotropic and homogeneous conductivity. ; Steady state conduction: Recapitulation of fundamentals analysis and design variable and cross section and circumferential fins. Analysis of heat conduction in 2-D fins, 2-D and 3-D conduction in solids with complex boundary conditions and heat generation. ;

Module II

Transient conduction: Recapitulation of transient conduction in simple systems. Analysis of transient heat conduction with complex boundary. ; Application of Duhamel's theorem and Special topics: Use of Laplace transformation in linear conduction problems. The use of Green function in the solution of the equations of conduction. ; Numerical methods: Fundamentals of discrimination treatment of boundary conditions, on linearity of properties, anisotropy and complex boundaries.

Module III

Radiation ; Recapitulation of fundamentals of radiative heat transfer, radiative properties of surfaces, methods of estimating configuration factors, heat exchange between diffusively emitting and diffusively reflecting surfaces. Radiant energy transfer through absorbing, emitting and scattering media. Combined conduction and radiation systems: fins, Introduction to solar radiation in earth's atmosphere.

Books

V.S Arpaci – *Conduction Heat Transfer*

E.M Sparrow, R.D Cess – *Radiation Heat Transf*

R.Siegel and J.R Howell-*Thermal radiation heat transfer*.

Y.A.Sengel, Heat Transfer, Tata McGrawHill

Krith, Fundamentals of Heat Transfer

Ozisik, Heat Transfer, John Wiley