

ME 521 Conduction and Radiation (3-0-0-6)

Conduction: Fourier's law of heat conduction, Initial and Boundary conditions, Steady and unsteady heat conduction problems and their solutions in Cartesian, cylindrical and spherical coordinates, Separation of variables method, Method of superposition, Bessel's equation and Bessel functions, Semi-infinite media, Laplace Transform, Approximate analytical solution, Conduction with Phase Change (Melting and Solidification).

Radiation: Laws of Radiation, Intensity of Radiation, Irradiation, Radiosity, Radiative properties of surfaces, Radiation exchange between surfaces, View Factor, Radiation exchange in a black enclosure, Radiative heat transfer in participating media (Gas Radiation), Radiative Transfer Equation.

References

1. D W Hahn, and M N Ozisik, Heat Conduction, John Wiley & Sons, 3rd Edition, 2012.
2. F P Incropera, D P Dewitt, T L Bergman, and A S Lavine, Incropera's Principles of Heat and Mass Transfer, Wiley, 2018.
3. V S Arpaci, Conduction Heat Transfer, Addison-Wesley, Reading, MA, 1966.
4. M F Modest, Radiative Heat Transfer, Academic Press, 3rd Edition, 2013.
5. J R Howell, M P Menguc, and R Siegel, Thermal Radiation Heat Transfer, CRC Press, 6th Edition, 2015.