

Module 4: Learning objectives

- The primary objective of this module is to develop an appreciation for the nature of two- or multi-dimensional conduction problems and the methods that are available for its solutions.
- For a multi-dimensional problem, the student should be able to determine whether an exact solution is known. This may be done by examining one or more of the many excellent references in which exact solutions to the heat equation are obtained.
- The student should understand what a conduction shape factor is, and link it to the concept of thermal resistances in 2D problems. The student should be able to determine whether the shape factor is known for the system, and if available, use to solve the heat transfer problem.
- However, if conditions are such that the use of a shape factor or an exact solution is not possible, the student should be able to use a numerical solution, such as the finite difference method..
- The student should appreciate the inherent nature of the *discretization process*, and know how to formulate the finite difference equations for the discrete points of a nodal network. Although one may find it convenient to solve these equations using hand calculations for a coarse mesh, one should be able to treat fine meshes using standard computer algorithms involving direct or iterative techniques.