



# ELECTRONICS ENCLOSURES THERMAL ISSUES

**PROF. N. V. CHALAPATHI RAO**

Department of Electrical and Electronics Engineering  
IISc

**TYPE OF COURSE** : Rerun | Elective | UG/PG

**COURSE DURATION** : 8 Weeks (15 Feb' 21 - 09 Apr' 21)

**EXAM DATE** : 24 Apr 2021

**PRE-REQUISITES** : 12th Standard

**INTENDED AUDIENCE** : Registrants to BSc, BE, B.Tech, MSc and ME, M.Tech courses, Product design engineers (in related industry) Product Managers

**INDUSTRIES APPLICABLE TO** : Electronics and Mechanical involved in enclosure Design

**COURSE OUTLINE** : Electronics Design is understood as analysis and implementation at various levels from large systems installation to chip design. One of the aspects is failure due to temperature effects is constantly under study. Theory of Heat transfer has been understood and explained way back in 1700. Rigor and precision has resulted in seemingly complicated 'equations'.

## ABOUT INSTRUCTOR :

NV Chalapathi Rao is a B.E. in Mechanical Engineering (1972) from Andhra University, Waltair. Worked in Bharat Electronics Ltd for 10 years designing electronics products for defense. Has a PGDM (MBA) 78-80 from IIM Bangalore. Has been teaching Design of Electronics Products and guiding Product Design projects at the Centre for Electronics Design and Technology (CEDT), Department of Electronics Systems Engineering (DESE) since 1984. He was one of the core faculty of Centre for Product Design and Manufacturing (CPDM) at the time of inception. And taught Product Planning and Management. He continues to advise students at DESE

## COURSE PLAN :

**Week 1:** Introduction to Enclosures and thermal issues; Basics of conductive heat transfer ; Radiation at normal ambient

**Week 2:** Convection basics; Forced convection , Combined modes

**Week 3:** Use of Conduction in enclosures; Radiation as a speciality

**Week 4:** Convective cooling in small products; Forced cooling in medium and large systems, Liquid cooled high power modules

**Week 5:** Novelty phase change and thermo electrics; Refrigerated cabinets

**Week 6:** Heat sinks practical application; Blowers, fans, ventilations of systems

**Week 7:** Instrumentation for measurement, Effects on sealed enclosures, Integration of ID with the heat aspects

**Week 8:** Case stories in biological instruments; Case study of select participants work, Application of Thermal CAD and round up