

**Indian Institute of Information Technology, Design and  
Manufacturing, Kancheepuram  
Chennai - 600127**

**NPTEL Lab Workshops  
on  
Mechanical Design Simulation Practice  
organized by  
Dr. Venkata Timmaraju Mallina**

**WORKSHOP DETAILS**

- a. NPTEL in coordination with IISER Pune, IISER Kolkata and IIITDM (Kanchipuram) is organizing 9 laboratory workshops that have to be attended in person.
- b. Each workshop is of 5 days duration and on the 6th day we will conduct a lab exam. NPTEL-SWAYAM e-certificates will be given to the attendees (no hard copies).
- c. The financial components include cost of travel, accommodation (at the institute hostel) and food which have to be borne by the students.
- d. The exam registration fee is Rs.200 More details can be found at link <https://nptel.ac.in/nptelWorkshop/>
- e. In case of queries write to **lab-workshops@nptel.iitm.ac.in** or call Ms. Bharathi or Ms. Kamala at **(044) 2257 5905, (044) 2257 5908** from 9am to 6pm.
- f. In case of technical queries about the content and so on, call Dr. Venkata Timmaraju Mallina at **(044) 2747 6325**.

**APPLICABLE ONLY TO STUDENTS**

**Duration: 1. 20-05-2019 to 25-05-2019**

**2. 27-05-2019 to 01-06-2019**

**Eligibility: B.Tech./B.E. 3<sup>rd</sup> Year second semester completed or  
M.Tech. 2<sup>nd</sup> Semester completed**

**No. Limit: 60 (First come first serve basis)**

# WORKSHOP CONTENT

## Objectives:

To make acquainted the students using computer aided engineering tools to design and analyze the structural, fluid flow and heat transfer related systems.

## Outcomes:

At the end of the course, a student will be able to:

1. Create 1D, 2D and 3D Finite Element Models of mechanical systems.
2. Understand the solution techniques available in computer aided engineering tools.
3. Evaluate the design of mechanical systems by conducting stress analysis, thermal analysis or fluid flow analysis.

## List of Experiments/Exercises:

### *Static Structural Analysis*

#### *Evaluation of Displacements, Stresses and Reaction Forces of*

1. axially loaded members – using bar and truss elements
2. transversely loaded members – using beam elements
3. combined axial and transverse loaded members – using frame elements
4. thin plates or discs – using four or eight node quadrilateral elements (plane stress)
5. long pipes or dams – using four or eight node quadrilateral elements (plane strain)
6. brackets – using four or ten node tetrahedrons or eight or twenty node hexahedron elements

### *Dynamic Structural Analysis -*

#### *Evaluation of natural frequencies and mode shapes of*

7. axially and transversely loaded members

### *Thermal Analysis - study of temperature distribution in*

8. fins or composite plane walls using one dimensional elements
9. chimneys or other plane sections using two dimensional elements

### *Steady state fluid flow analysis -*

#### *study of velocity distribution of fluid in*

10. channels or pipes over bluff bodies