I YEAR M. TECH (MACHINE DESIGN) SECOND SEMESTER

17MEMD2L1   **ANALYSIS LAB**   **Credits 2**

Lecture: 3 periods/week   **Internal assessment: 25 marks**

Tutorial: - -   **Semester end examination: 50 marks**

COURSE OBJECTIVES:

- To provide the fundamental concepts of the theory of the finite element method
- To understand the use of the basic finite elements for structural applications using   truss, beam, frame, and plane elements
- To understand the application and use of the FE method for heat transfer problems
- To develop proficiency in the application of the finite element method (modeling, analysis, and interpretation of results) to realistic engineering problems

COURSE OUTCOMES:

After completion of the course, student should be able to

1. Demonstrate the ability to create models for trusses, frames, plate structures, machine parts, and components using ANSYS general-purpose software
2. Use the ANSYS package to solve basic engineering analysis problems using FEA techniques
3. Model heat transfer, fracture, vibrational problems using ANSYS
4. Demonstrate the ability to evaluate and interpret FEA analysis results for design and evaluation purposes
5. Develop a basic understanding of the limitations of the FE method and understand the possible error sources in its use

Any 12 tasks on the following:

1. Analysis of a Truss Structure with multipoint constrains

2. Analysis of a Slit Ring

3. Analysis of a Plate with a Circular Hole

4. Analysis of a bi-material cylindrical pressure vessel under internal pressure (Plane strain approach)

5. Analysis of an Axisymmetric Shell with Internal Pressure

6. Analysis of a Layered Composite Plate

7. Linear Buckling Analysis

8. Thermo-Mechanical Analysis

9. Fracture analysis of plate with center crack

10. Vibration of an Automobile Suspension

11. Harmonic Analysis of a Guitar String

12. Impact Loading on a Beam

13. Dynamic Analysis of a 4-bar Linkage

14. Transient Thermo-Mechanical Analysis of a Welded Joint

15. Large Deformation Analysis of a Plate

16. Plastic Deformation of an Aluminum Sphere

17. Contact Analysis of a Block Dropping on a Beam

18. Simulation of a Nano-Indentation Test

REFERENCES:

User manuals of ANSYS package