

Modeling and Analysis Lab (FEA)

Course	Code	Credits	L-T-P	Assessment		Exam Duration
				SEE	CIA	
Modeling and Analysis Lab	15MEL68	02	1-0-2	80	20	3Hrs

CREDITS – 02

Prerequisites: Knowledge of any Modeling software, knowledge of coordinate systems and Geometric transformations etc.

Course objectives:

- The course is intended to provide basic understanding of Modeling and Analysis techniques students with following aspects:
- To acquire basic understanding of Modeling and Analysis software
- To understand the different kinds of analysis and apply the basic principles to find out the stress and other related parameters of bars, beams loaded with loading conditions.
- To learn to apply the basic principles to carry out dynamic analysis to know the natural frequency of different kind of beams.

PART – A

Study of a FEA package and modeling and stress analysis of:

1. Bars of constant cross section area, tapered cross section area and stepped bar
2. Trusses – (Minimum 2 exercises of different types)
3. Beams – Simply supported, cantilever, beams with point load , UDL, beams with varying load etc (Minimum 6 exercises different nature)
4. Stress analysis of a rectangular plate with a circular hole

PART – B

- 1) Thermal Analysis – 1D & 2D problem with conduction and convection boundary conditions (Minimum 4 exercises of different types)
- 2) Dynamic Analysis to find
 - a) Fixed – fixed beam for natural frequency determination 41
 - b) Bar subjected to forcing function
 - c) Fixed – fixed beam subjected to forcing function

PART – C (only for demo and oral exam)

- 1) Demonstrate the use of graphics standards (IGES, STEP etc) to import the model from modeler to solver
- 2) Demonstrate one example of contact analysis to learn the procedure to carry out contact analysis.
- 3) Demonstrate at least two different type of example to model and analyze bars or plates made from composite material

Course Outcomes: At the end of the course the students are able to:

- Demonstrate the basic features of an analysis package.
- Use the modern tools to formulate the problem, and able to create geometry, discretize, apply boundary condition to solve problems of bars, truss, beams, plate to find stress with different loading conditions. • Demonstrate the deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams.
- Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.
- Carry out dynamic analysis and finding natural frequencies for various boundary conditions and also analyze with forcing function.

REFERENCE BOOKS:

1. A first course in the Finite element method, Daryl L Logan, Thomson, Third Edition
2. Fundamentals of FEM, Hutton – McGraw Hill, 2004
3. Finite Element Analysis, George R. Buchanan, Schaum Series

Scheme for Examination:

One Question from Part A - 32 Marks (08 Write up +24)

One Question from Part B - 32 Marks (08 Write up +24)

Viva-Voce - 16 Marks

Total 80 Marks