

**Modeling and Analysis Lab (FEA)**  
**B.E, VI Semester, Mechanical Engineering**  
**[As per Choice Based Credit System (CBCS) scheme]**

Course Code	17MEL68	CIE Marks	40
Number of Lecture Hours/Week	03 (1 Hour Instruction+ 2 Hours Laboratory)	SEE Marks	60
RBT Levels	L1, L2, L3	Exam Hours	03
Credits – 02			
Course objectives:			
<ul style="list-style-type: none"> <li>To acquire basic understanding of Modeling and Analysis software</li> <li>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.</li> <li>To learn to apply the basic principles to carry out dynamic analysis to know the natural frequency of different kind of beams.</li> </ul>			
PART – A			
<ol style="list-style-type: none"> <li>1. Bars of constant cross section area, tapered cross section area and stepped bar</li> <li>2. Trusses – (Minimum 2 exercises of different types)</li> <li>3. Beams – Simply supported, cantilever, beams with point load, UDL, beams with varying load etc (Minimum 6 exercises different nature)</li> <li>4. Stress analysis of a rectangular plate with a circular hole</li> </ol>			
PART – B			
<ol style="list-style-type: none"> <li>1) Thermal Analysis – 1D &amp; 2D problem with conduction and convection boundary conditions (Minimum 4 exercises of different types)</li> <li>2) Dynamic Analysis to find               <ol style="list-style-type: none"> <li>a) Fixed – fixed beam for natural frequency determination</li> <li>b) Bar subjected to forcing function</li> <li>c) Fixed – fixed beam subjected to forcing function</li> </ol> </li> </ol>			
PART – C			
<ol style="list-style-type: none"> <li>1) Demonstrate the use of graphics standards (IGES, STEP etc) to import the model from modeler to solver</li> <li>2) Demonstrate one example of contact analysis to learn the procedure to carry out contact analysis.</li> <li>3) Demonstrate at least two different type of example to model and analyze bars or plates made from composite material</li> </ol>			

**Course outcomes:**

- 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 - 40Marks (10 Write up +30)

One Question from Part B - 40 Marks (10 Write up +30)

Viva-Voce - 20 Marks

**Total 100 Marks**

  
H.O.D.

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