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**MMPD - 105****M.E./M. Tech., I Semester**

Examination, December 2015

**Computer Aided Engineering and Optimization***Time : Three Hours**Maximum Marks : 70*

**Note :** Attempt any five questions. All questions carry equal marks.  
Draw neat diagrams wherever required.

1. a) State merits and de-merits of analytical, numerical, and experimental methods to solve engineering problem.  
b) Discuss Practical applications of FEA in new design.
2. a) Explain the steps involved in finite element analysis – displacement approach.  
b) Explain the following terms:
  - i) Degree of freedom for engineering system
  - ii) Stiffness constant.
3. a) Define CFD. State applications and basic steps to solve the problems using CFD concept.  
b) Differentiate conforming and non-conforming elements.
4. a) State the comparison between tria and quad elements.  
b) State brief about Duplicate nodes.

5. Write technical note on following (any two):

- a) Three dimensional meshing.
- b) CAE and test data correlations.
- c) Shrink fit simulations.

6. Two links, made up of aluminum and steel, are connected by a hinge joint and an axial load  $P = 1000 \text{ N}$  is applied at node 3 as shown in Figure 1. Determine the stresses developed in the two links using the finite element method.

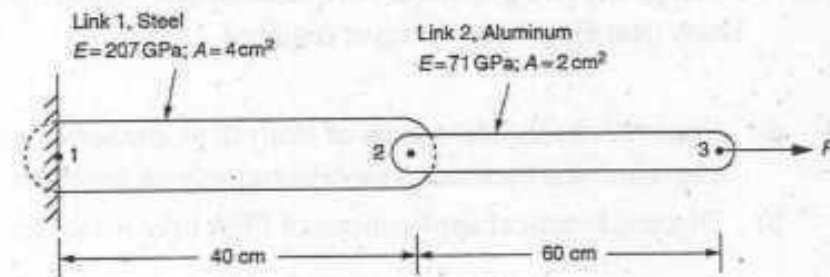


Fig. 1: Question 6: Two Links Subjected to an Axial Load.

7. a) Define optimization. Compare process and product optimization.  
b) What do you mean by design abuses? Discuss any three design abuses.
8. Write short note on following: (any two)
  - a) Warranty yard meetings.
  - b) Concurrent-collaborative design cycles.
  - c) Cost-cutting and failure analysis.
  - d) Node Numbering Scheme.