

Basic Mechanical Engineering (ME2001)

Date: April 9, 2025

Course Instructor(s)

Mohsin Yousuf

Sessional-II Exam

Total Time (Hrs): 1

Total Marks: 40

Total Questions: 2

Roll No

Section

Student Signature

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1. Attempt all the questions, programmable calculators not allowed.
2. Attempt all parts of the same question together.
3. Show all the steps with the help of diagrams and answers with proper units.
4. The hints are given in *italics*.

CLO # 02: Analyze static equilibrium analysis of a rigid body by applying Newton Laws of Motion and concept of dry friction. [C4]

- Q1:** The car shown in the Figure 1 below is of 1600 kg. The car is rear-wheel drive [20 marks] and is just beginning to negotiate the 16° ramp. **Figure out** the minimum coefficient of static friction μ_s required at B.

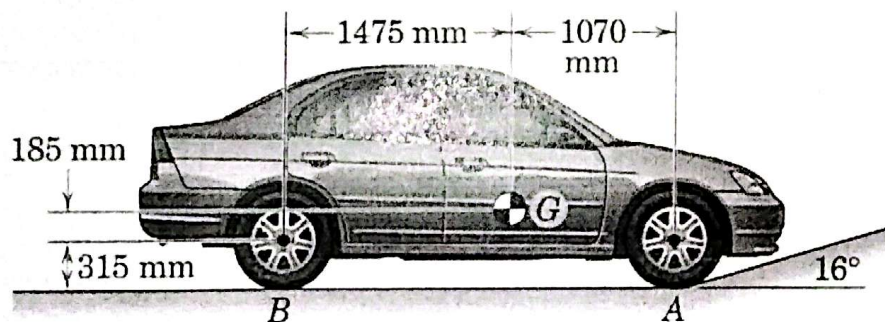


Figure 1. A 1600 kg about to drive the ramp

Hint: Draw the complete FBD first and mention the normal force N_B and frictional force F_B at the surface of the rear-wheel; point B.

For point A, the FBD is shown ahead.



CLO # 05: Evaluate the internal forces in the members of a loaded truss and assess safety of the structure. [C6]

Q2: The truss shown in the Figure 2 has pin at A and roller at C. Determine the force in each member using the method of joints by carefully identifying zero-force members as well. Verify the axial force in the FC using the method of sections. [20 marks]

All members have a circular cross-section having radius of 0.01 m. Evaluate which material is suitable for the truss to avoid damage to the structure and compute its factor of safety as well.

Table 1. Ultimate Tensile Strength

Lead	Al	Iron
12 MPa	40 MPa	5 MPa

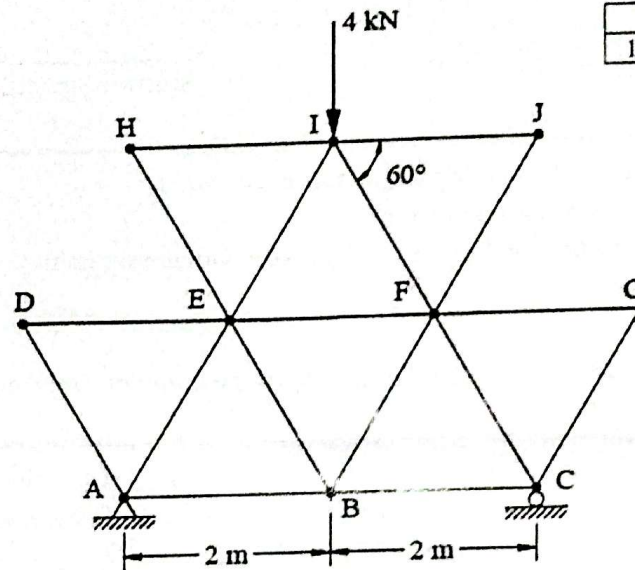


Figure 2. An equilateral triangle truss.