

Basic Mechanical  
Engineering (ME2001)

Date: April 3<sup>rd</sup> 2024

Course Instructor(s)

1. Dr. Kashif Saeed

2. Mohsin Yousuf (CM)

Sessional-II Exam

Total Time (Hrs): 1

Total Marks: 40

Total Questions: 2

22L-6234

Roll No

4A1

Section

Haseeb  
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.

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

**Q1:** The ladder and the person weigh 15 kg and 80 kg, respectively. The center of mass of the 3.65 m ladder is at its midpoint (point C) as shown in Fig. 1. The angle  $\alpha = 30^\circ$ . Assume that the wall exerts a negligible friction force on the ladder at point A.

- (a) If  $x = 1.2$  m, determine the magnitude of the friction force  $f_B$  exerted on the ladder by the floor?
- (b) The person wants to climb to the top the ladder without slipping, figure out minimum coefficient of static friction between the ladder and the floor.

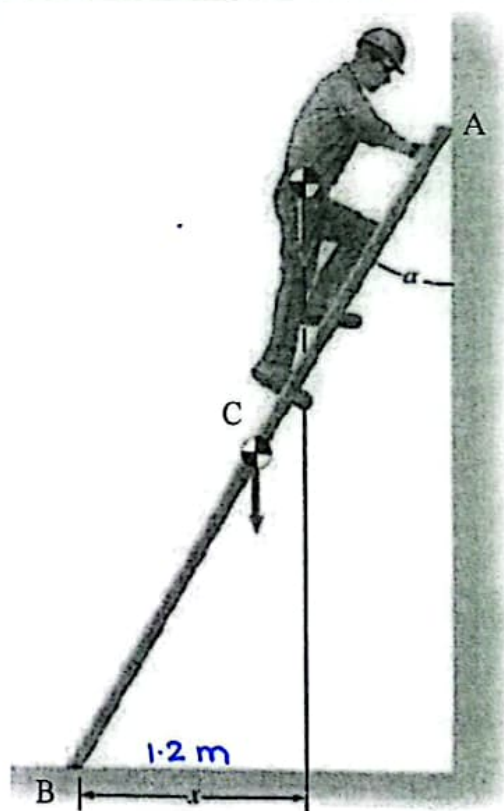


Figure 1. The person on the ladder

[20 marks]

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

Q2: The structure shown in Fig. 2 is being supported at points  $A$  and  $G$ . Use method of sections to evaluate the axial (internal) forces in members  $AB$ ,  $BC$  and  $CE$ . Take  $F = 1000$  N.

[20 marks]

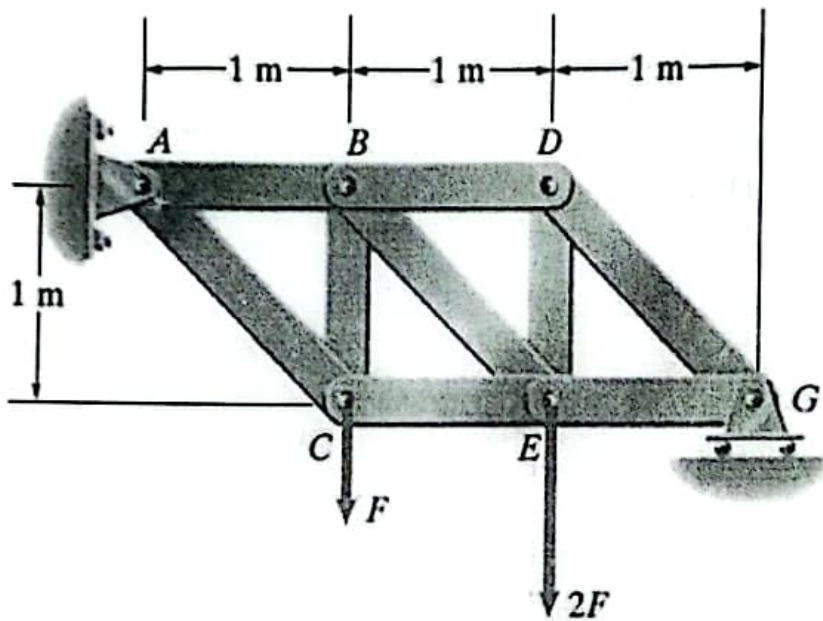


Figure 2. A Truss supported by pin at  $A$  and roller at  $G$