



**WALCHAND COLLEGE OF ENGINEERING**  
(Government Aided Autonomous Institute)  
Visharambag, Sangli - 416415  
**First Year B.Tech. Electrical and Computer Science Engg.**  
**MSE, ODD SEMESTER, AY 2023-24**  
**Engineering Mechanics (7AM102)**



**MSE**

PRN: \_\_\_\_\_

Day & Date: Monday, 23/10/2023 Time: 3.30 pm to 5.00 pm

Max Marks: **30**

**IMP: Verify that you have received question papers with correct course code, branch etc.**

**Instructions**

- All questions are compulsory.
- Writing question number on answer book is compulsory otherwise answers may not be assessed.
- Assume suitable data wherever necessary.
- Figures to the right of question text indicate full marks.
- Mobile phones, smart gadgets and programmable calculators are strictly prohibited.
- Except PRN anything else writing on question paper is not allowed.
- Exchange/Sharing of stationery, calculator etc. not allowed.

Text on the right of marks indicates course outcomes (Only for faculty use)

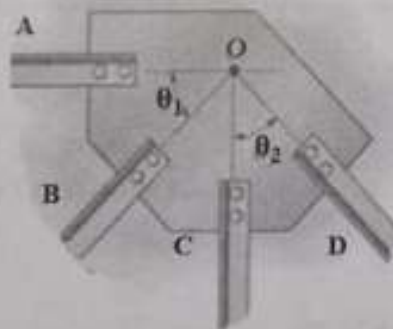
**Marks**

**Q1 A) What are the idealizations in Engineering Mechanics? Write examples for each.**

**2 CO1**

**B) Determine the forces in the members B and C connected to the Gusset plate as shown in Fig. 1 The forces in members A and D, are 6 kN (Compression) and 9 kN (Tension), respectively. (Given  $\theta_1=45^\circ$ ,  $\theta_2=30^\circ$ )**

**CO2**



**Fig. 1**

**2**

- Q2 A) A c/s of the dam is shown in Fig. 2 below. For the stability of the dam the resultant of all forces should pass through the middle third of the base of the dam. Verify if the dam is safe or not.

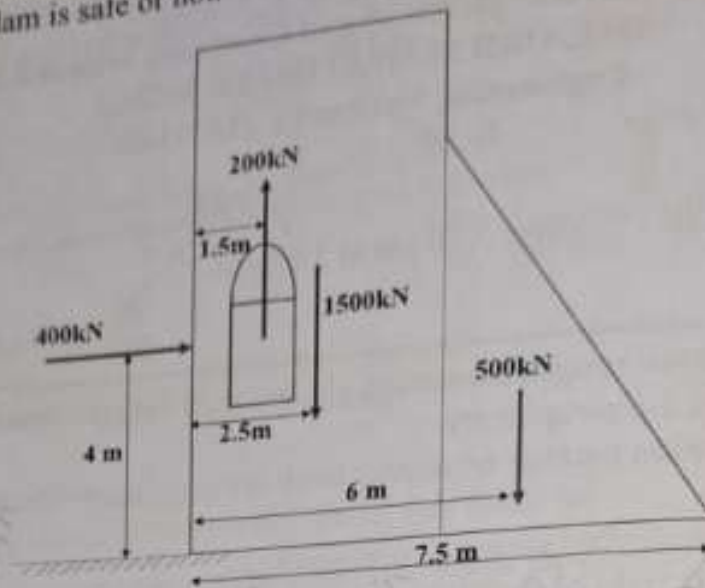


Fig. 2

- B) Analyze the beam shown in Figure.

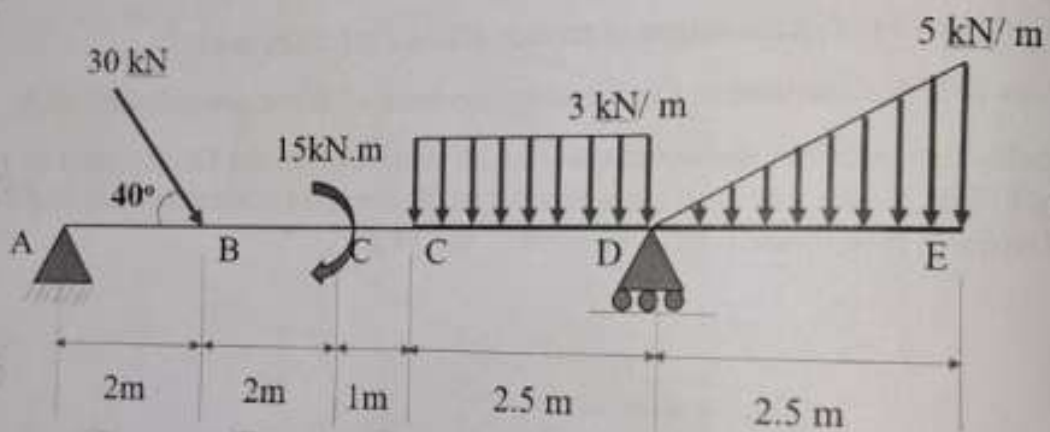


Fig. 3

- C) Determine the support reactions for the beam shown in Fig. using a principle of virtual work.

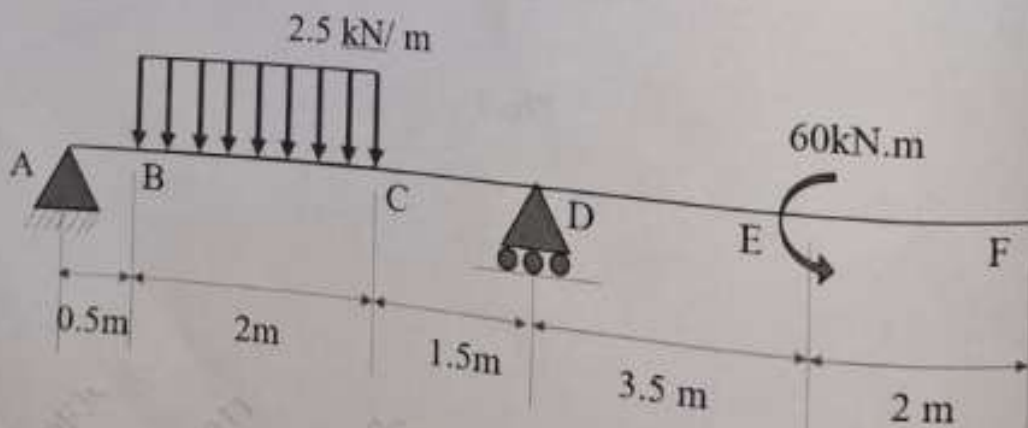


Fig. 4

D) Determine the moment at the base (A) of the Jib-crane as shown in the figure.

CO2

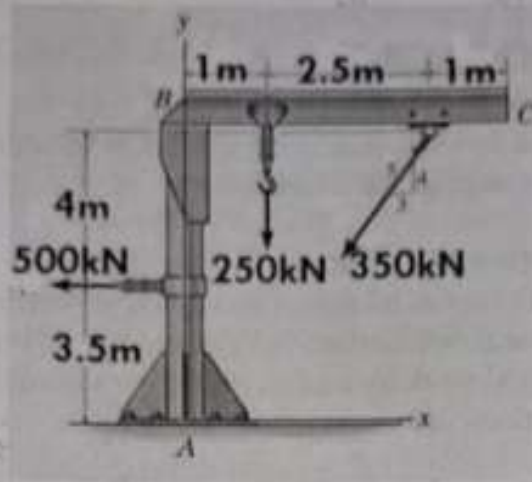


Fig. 5

A) Determine whether the structures below are statically determinate or indeterminate. Also find their static degree of indeterminacy.

CO2

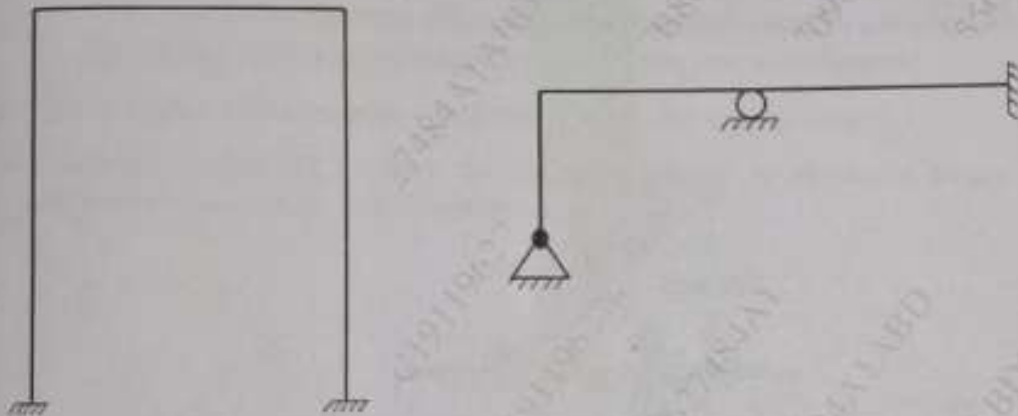


Fig. 6

B) Determine the centroid of the Plane lamina as shown in the figure.

CO2

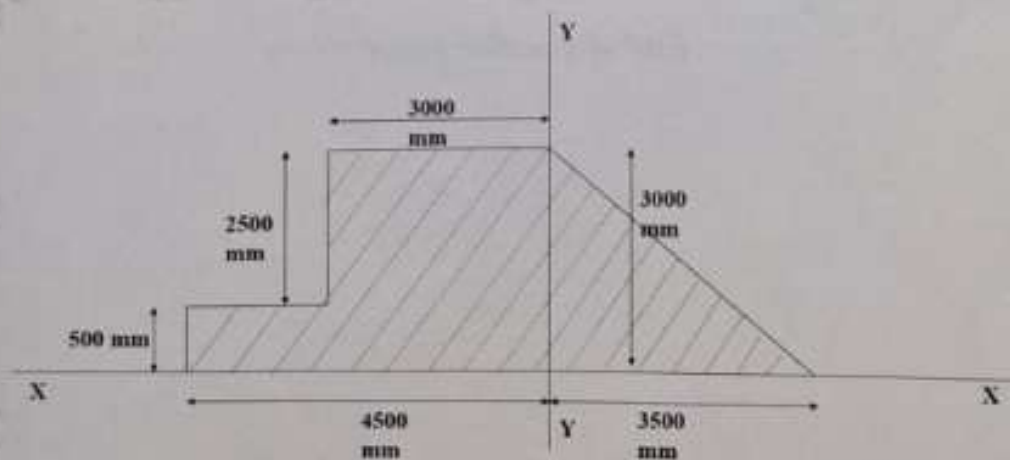


Fig. 7

C) Choose the incorrect statement(s) from the following:

A. Rigid body

1. has negligible dimensions.
2. has nearly zero deformations.
3. has negligible deformations as compared to the dimensions of the body.
4. does not have negligible deformations.

B. For a body in static equilibrium.

1. The Algebraic sum of all forces and moments acting on the body is zero.
2. The translational equilibrium is achieved by the body.
3. The total virtual work by all forces for any virtual rotation is non-zero.
4. The accelerations in any directions are zero.

D) The Achilles tendon force  $F_t$  is mobilized when the man tries to stand on his toe. As this is done each of his feet is subjected to the reactive force of  $N_f = 400 \text{ N}$ . If the resultant moment produced by  $F_t$  and  $N_f$  about the ankle joint A is required to be zero. Determine the magnitude of the for  $F_t$ .

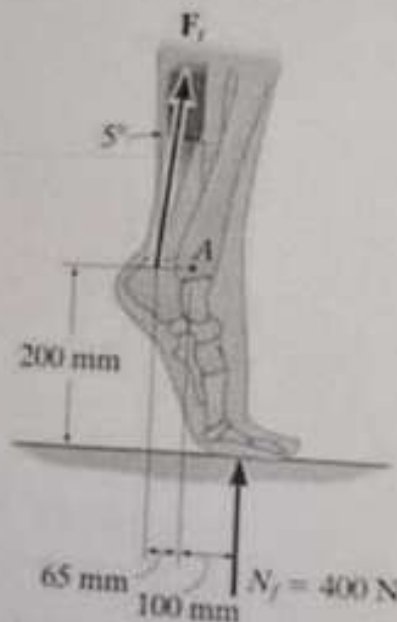


Fig. 8

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