

FINAL
Alternative Assessment

Session : August 2021

Programme : Foundation in Science (CFSI)

Course : **EGR1203: Engineering Mechanics**

Date of Examination : 7 December 2021 (Tuesday)

Time : 9:00am – 11:30am Reading Time : Nil

Duration : 2 hours + 30 minutes (uploading time)

Special Instructions :

This paper consists of **FOUR (4)** questions. Answer all questions.

All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Nil

Examiner(s) : **Dr. Beh Boon Chun**

Chief Moderator : Ms. Nurhakimah Abd Aziz

This paper consists of 6 printed pages, including the cover page.

FOUNDATION IN SCIENCE (CFSI)
EGR1203: ENGINEERING MECHANICS
FINAL ALTERNATIVE ASSESSMENT: AUGUST 2021 SESSION

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Question 1

(a) Referring to **Figure Q1(a)**,

- (i) Express the x and y component of each force using Cartesian vector notation. (6 marks)
- (ii) Determine the magnitude and direction of the resultant force. (7 marks)

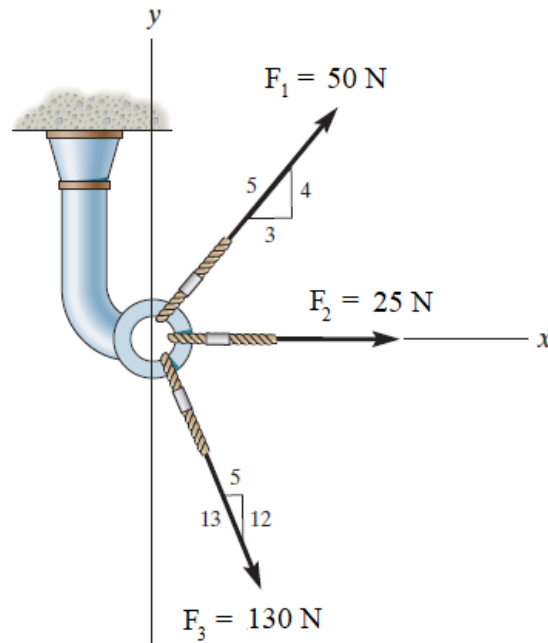


Figure Q1(a)

- (b) Referring to **Figure Q1(b)**, compute the force acting in each string for the 50 kg block to be in equilibrium. (12 marks)

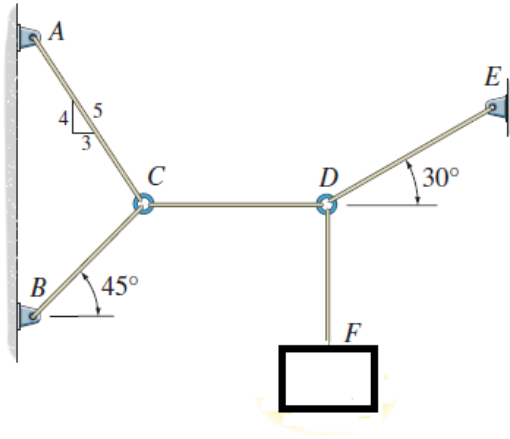


Figure Q1(b)

Question 2

- (a) Referring to **Figure Q2(a)**,
- (i) If $F = 150 \text{ N}$, determine the moment of the force about point X. (4 marks)
 - (ii) Determine the magnitude of F needed if a clockwise moment of 45 N m about point X is required to get out the pin at point Y. (4 marks)
 - (iii) Move F to point Z where the force making an angle of 20° with the line of 3 cm. Determine the magnitude of F needed if a clockwise moment of 45 N m about point X is required to get out the pin at point Y. (4 marks)

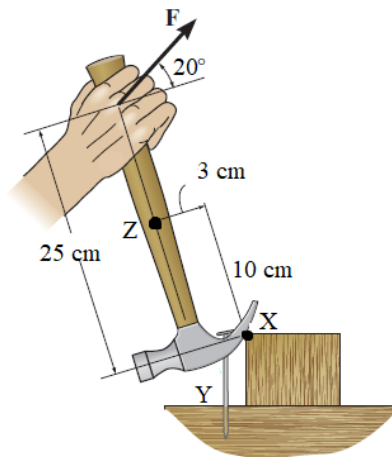


Figure Q2(a)

- (b) Referring to **Figure Q2(b)**, if $F = 100$ kN, compute the reaction support at A and the force exerted on the cord BC . (8 marks)

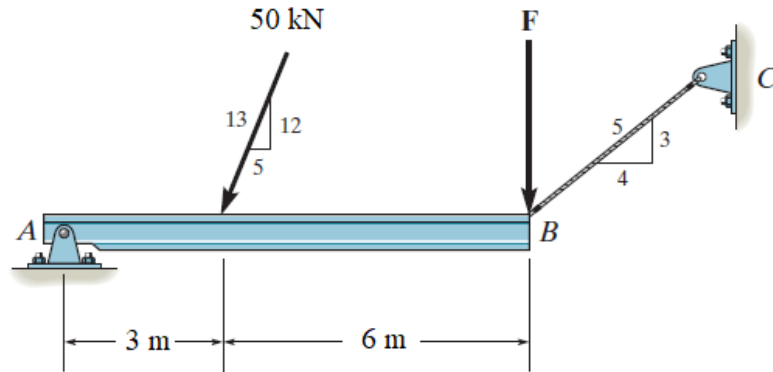


Figure Q2(b)

- (c) Referring to **Figure Q2(c)**, compute the force F to pull the 25 kg wheel over the smooth tile that have the thickness of 50 mm. Given $\theta = 40^\circ$. (5 marks)

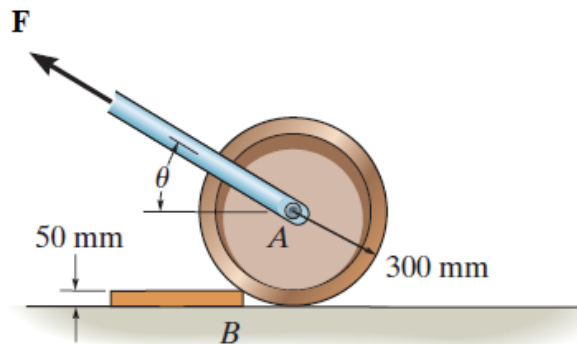


Figure Q2(c)

Question 3

- (a) Referring to **Figure Q3(a)**, determine the force in members *BC*, *CI* and *HI* of the truss and state if the members are in tension or compression. (13 marks)

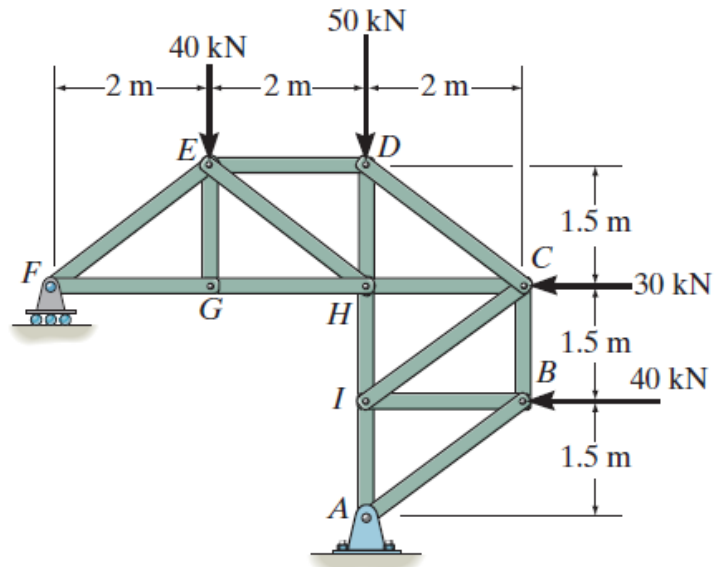


Figure Q3(a)

- (b) Referring to **Figure Q3(b)**, calculate the internal normal force, shear force and moment at point *C* in the beam. (12 marks)

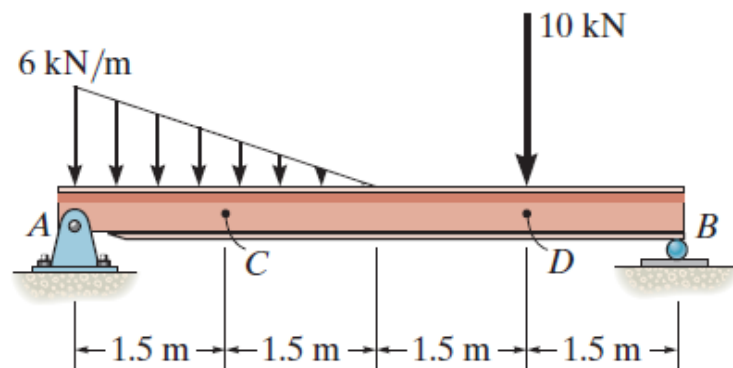


Figure Q3(b)

Question 4

- (a) A person who have weight of 750 N move up a ladder that is lying on a smooth wall at point B . He stops at the position as shown in **Figure Q4(a)** when he notices that the ladder is on the verge of slipping. By ignoring the weight of the ladder, compute
- the coefficient of static friction between the friction pad at A and ground if $\theta = 50^\circ$, and (5 marks)
 - the angle θ if $\mu_s = 0.35$ between the friction pad at A and the ground. (Hint: $\sec^2\theta = 1 + \tan^2\theta$) (8 marks)

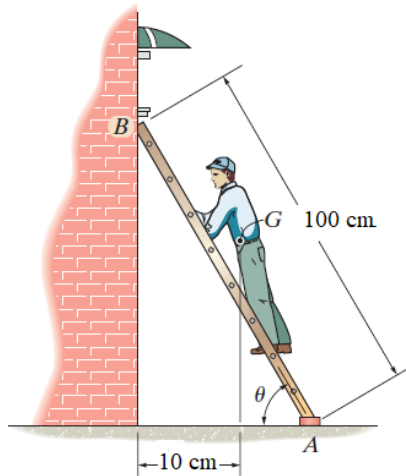


Figure Q4(a)

- (b) Compute the centroid (\bar{x}, \bar{y}) of the shaded area as shown in **Figure Q4(b)** using **horizontal differential element**. (12 marks)

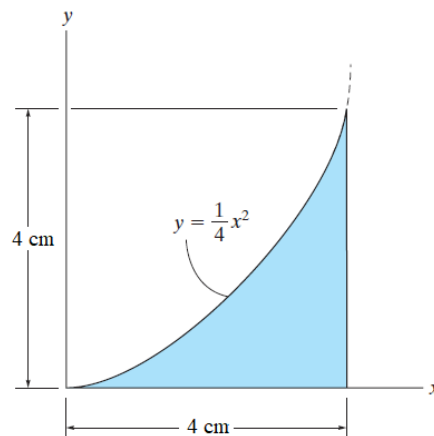


Figure Q4(b)

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