

اسئلة سنوات

استاتيكا

Statics



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0785705188



Al Balqa' Applied University Faculty of Engineering Department of Road and Bridge Engineering		
رقم الطالب :		إسم الطالب :
وقت المحاضرات :		مدرس الشعبة :

Statics Second Exam – 5th May 2014

Exam time: 50 minutes

ANSWER ALL QUESTIONS -WRITE YOUR FINAL ANSWERS ON THIS PAPER-

-SHOW YOUR CALCULATIONS ON THE ANSWER SHEET- Final answers with no solution will get ZERO

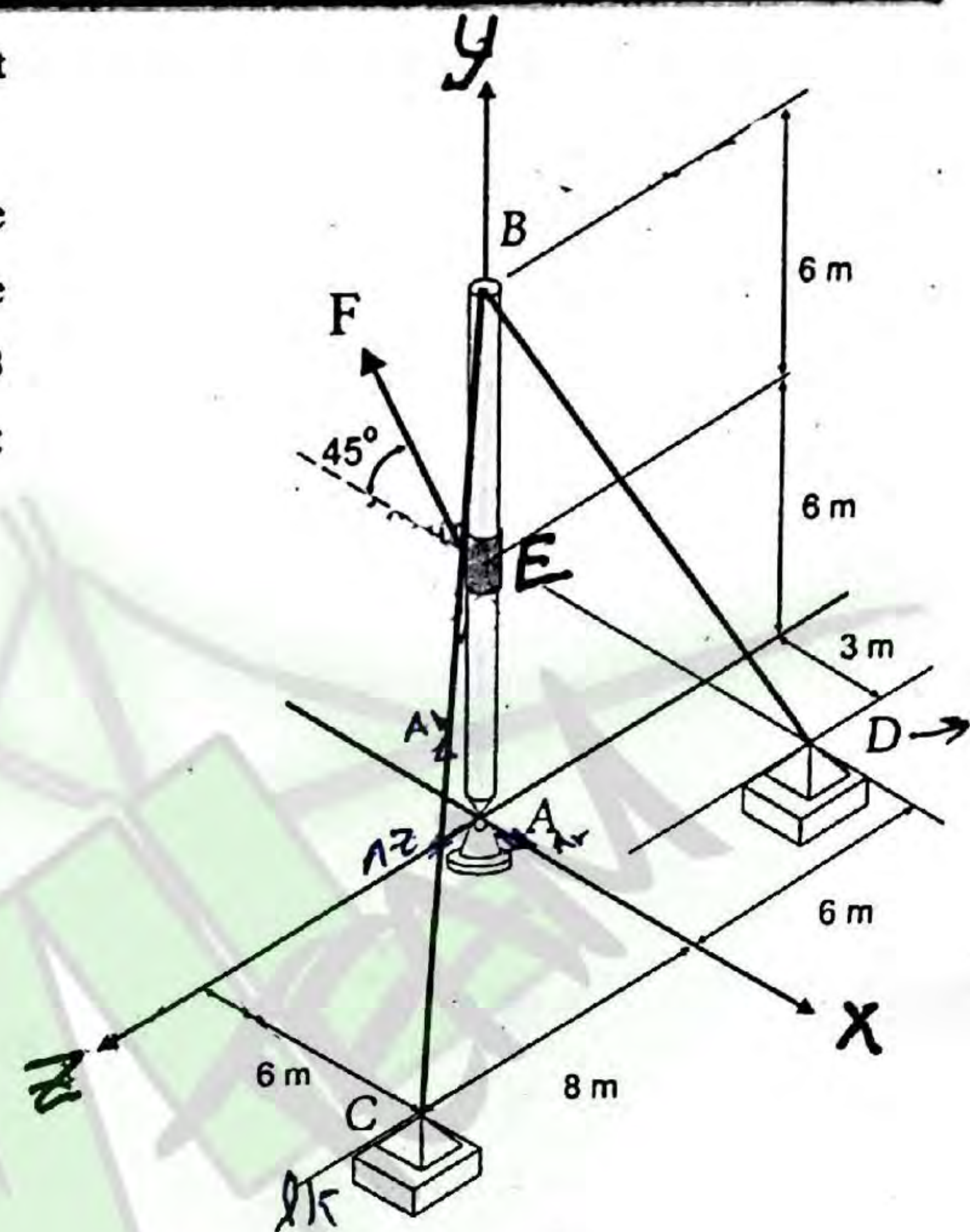
Q1- The flag mast AB shown is supported by a ball and socket support at A and by cables from point B to points C and D.

The mast is subjected to force $F = 800 \text{ N}$ that acts in the middle of the mast. F is in the z - y plane and the direction of F make 45° with an axis parallel to y axis. Given that the member AB is in equilibrium, determine the tension in the cables:

(10 marks)

1.1- T_c

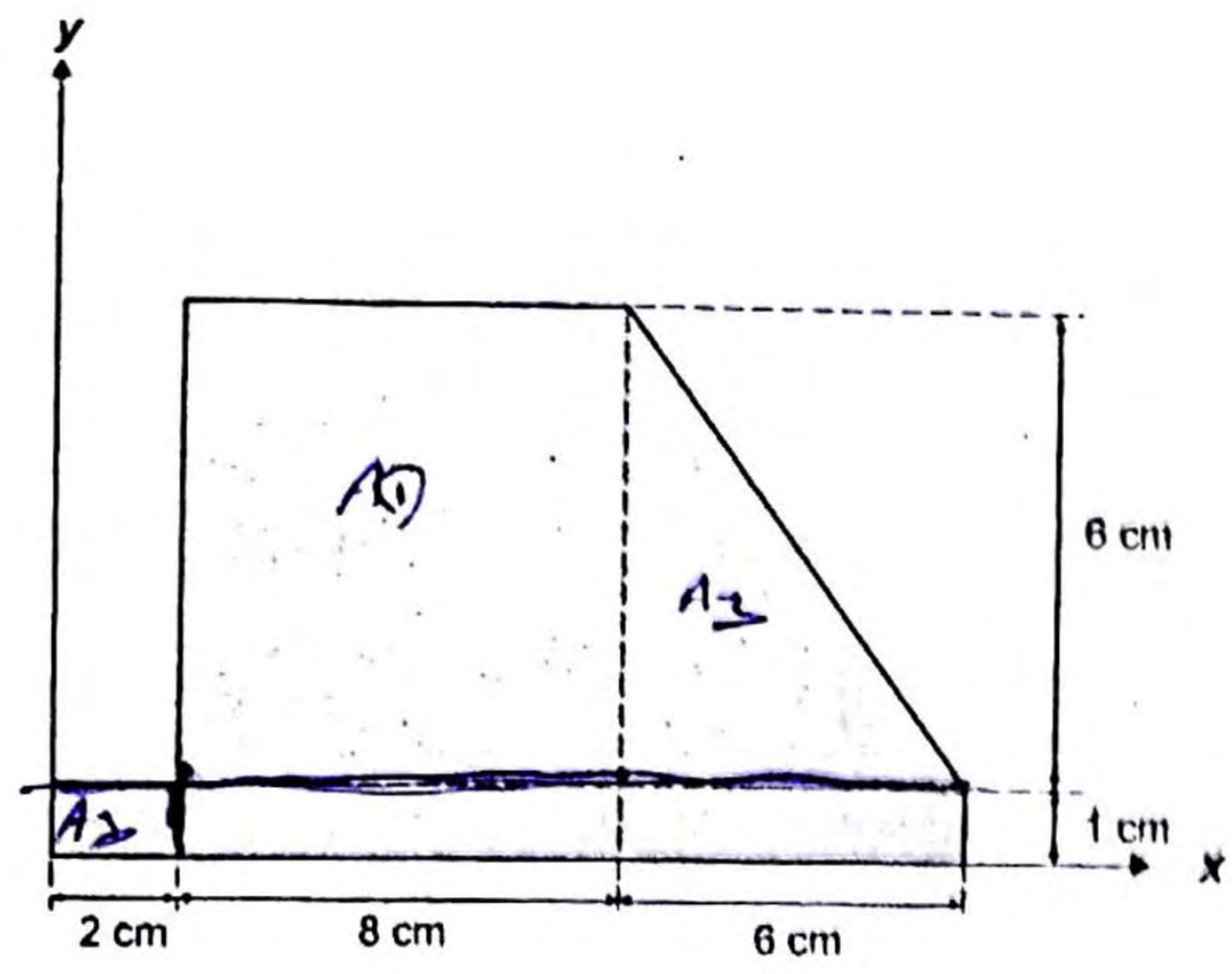
1.2- T_D




Q2- Given the shaded area shown, determine the x and y coordinates of the centroid:

(10 marks)

\bar{X} (cm)	\bar{Y} (cm)



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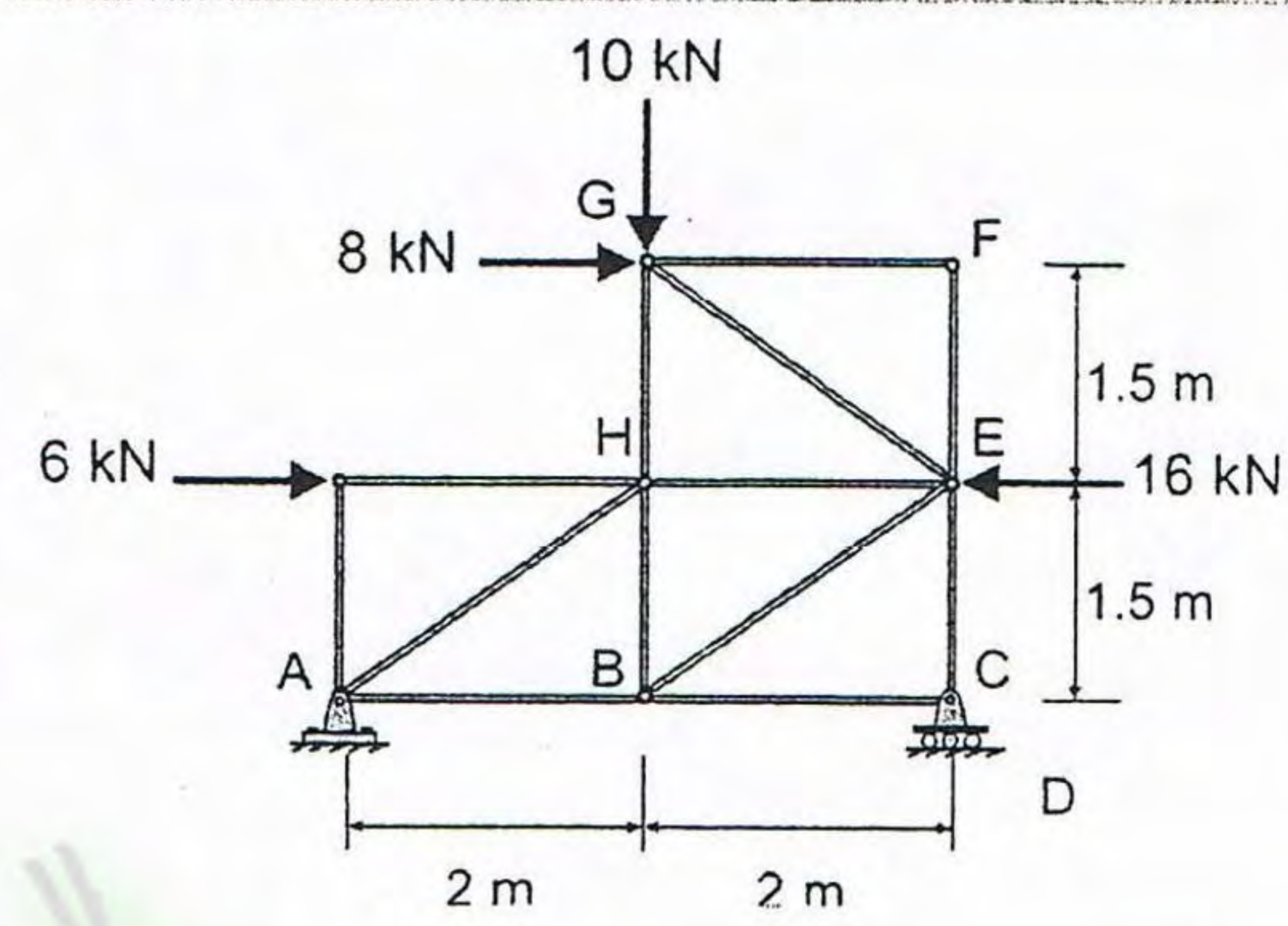
A

Statics
-Second Exam- 23rd April 2011

- 1- Answer all questions and show your calculations clearly and in details on the additional A4 paper.
2- A Final answer without a solution will get **NO** marks
- ملاحظة مهمة: يجب تسليم كراس الحل مع ورقة الامتحان معاً بعد نقل الأجوبة النهائية إلى الأماكن المخصصة على ورقة الامتحان

Q1- For the truss subjected to the shown forces, the internal force in member GF is:

F_{GF} : *zero member* (3 marks)

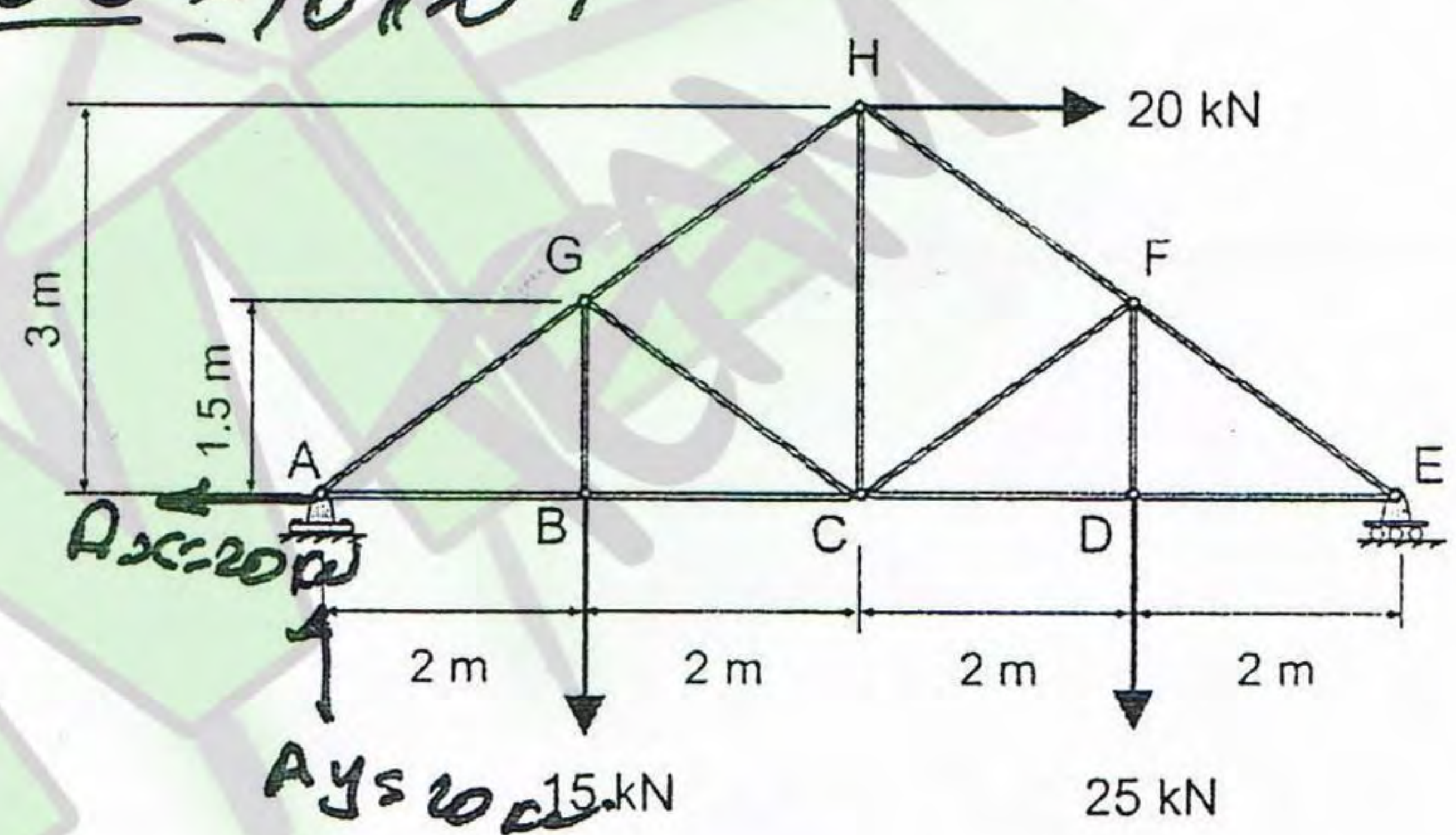


$\sum \mathcal{M}_E = 0 \quad A_y = \frac{25 \cdot 2 + 15 \cdot 6}{3} = 10 \text{ kN} \uparrow$

$\sum \mathcal{F}_x = 0 \quad A_x = 20 \text{ kN} \leftarrow$

Q2- For the truss subjected to the shown forces, the horizontal and vertical components of the reaction at A are:

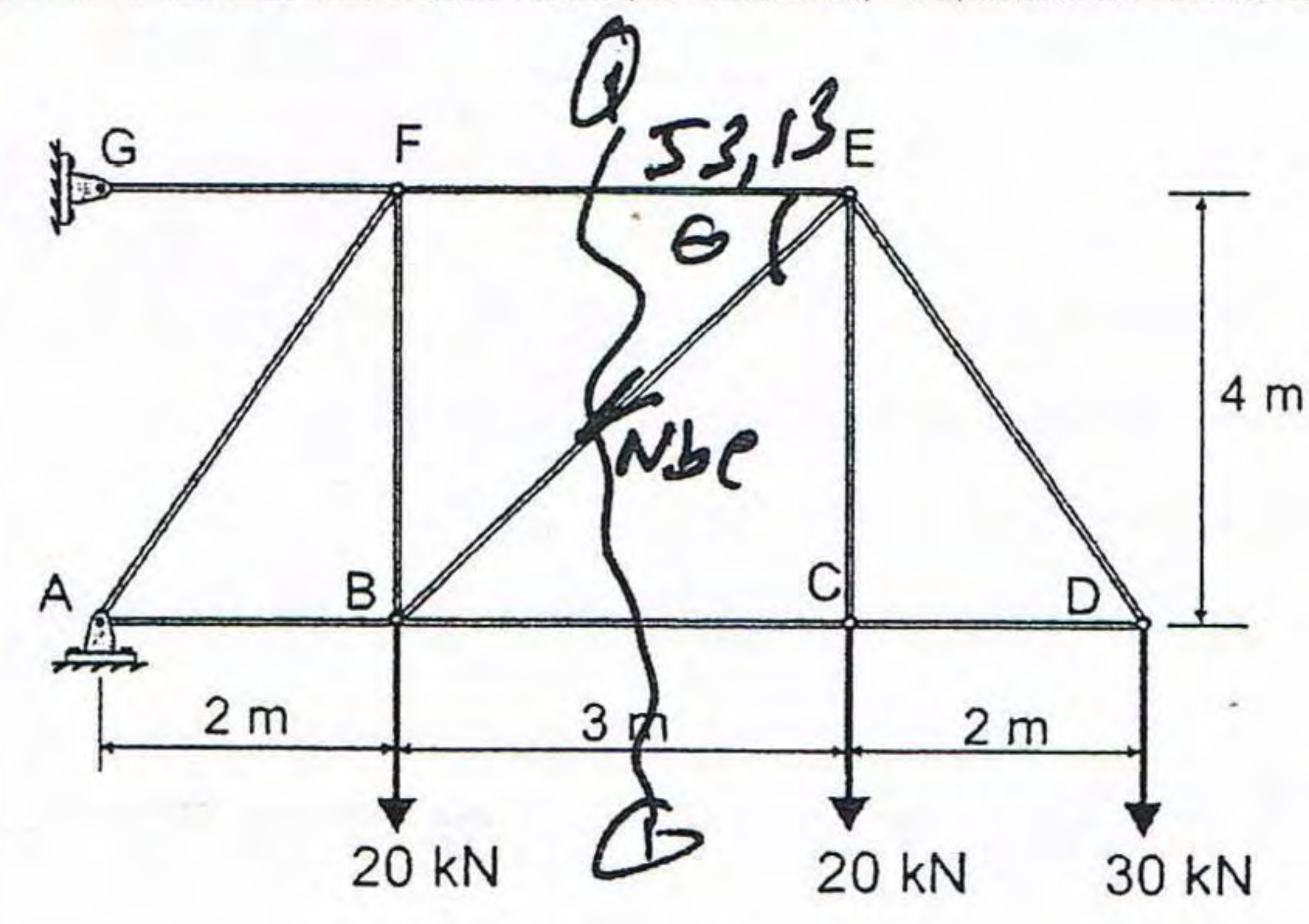
A_x : *20 kN*, A_y : *10 kN* (3 marks)



Q3- For the truss subjected to the shown forces, the internal force in member BE is:

F_{BE} : *62.5 kN comp.* (3 marks)

see 1-1
 $\sum F_y = 0$



$\theta = \tan^{-1} \frac{4}{3} = 53.13^\circ$

$-N_{be} \sin 53.13 - 20 - 30 = 0$

$N_{be} = \frac{-50}{\sin 53.13} = -62.5 \text{ kN}$

(A)

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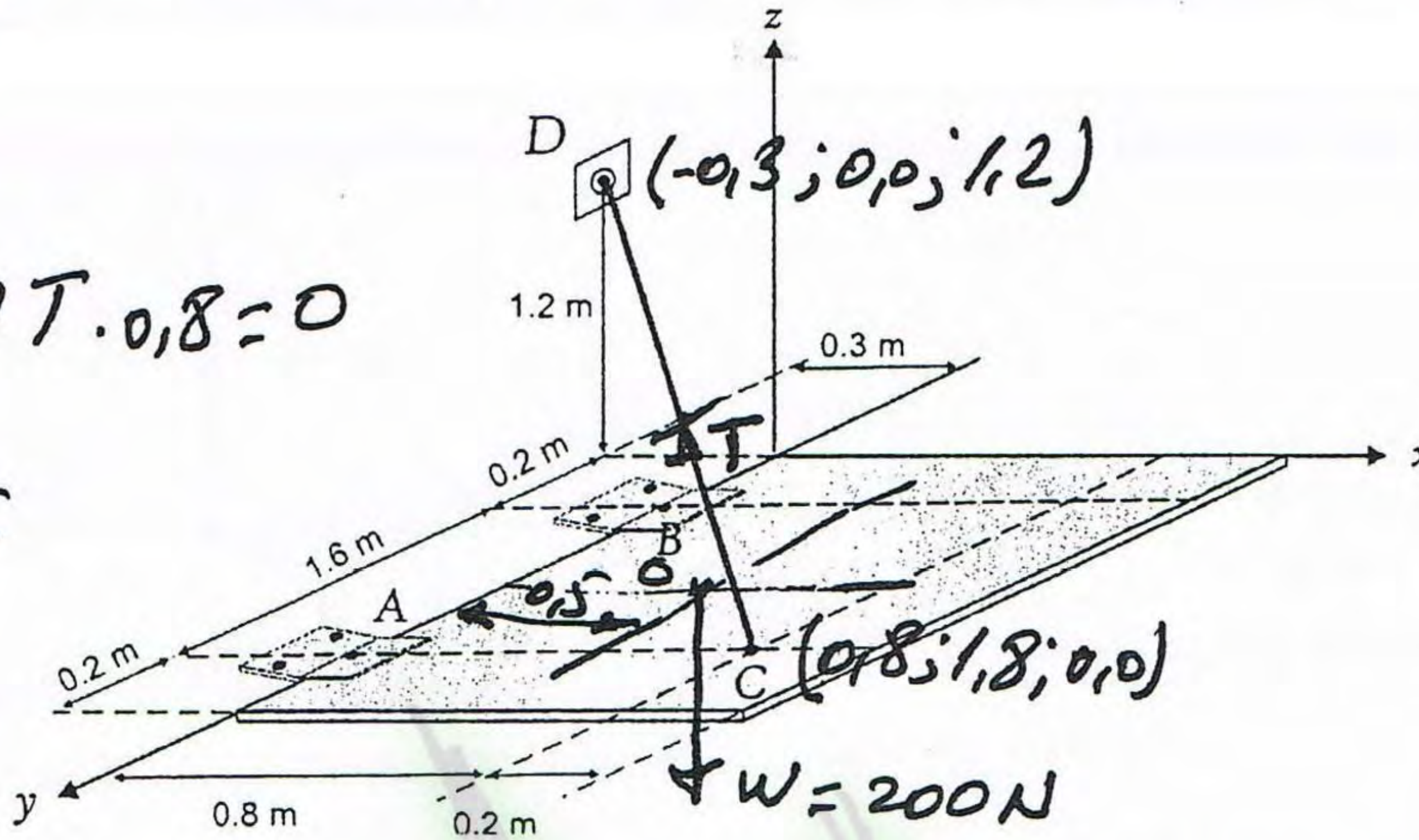
$$\bar{W} = (-200\text{ k}) \text{ N}$$

$$\bar{T} = \frac{T}{\sqrt{1.2^2 + 1.8^2 + 1.2^2}} (-1.1\text{ i} - 1.8\text{ j} + 1.2\text{ k}) = (-0.45T\text{ i} - 0.74T\text{ j} + 0.49T\text{ k})$$

$$\sum M_{ab} = 0$$

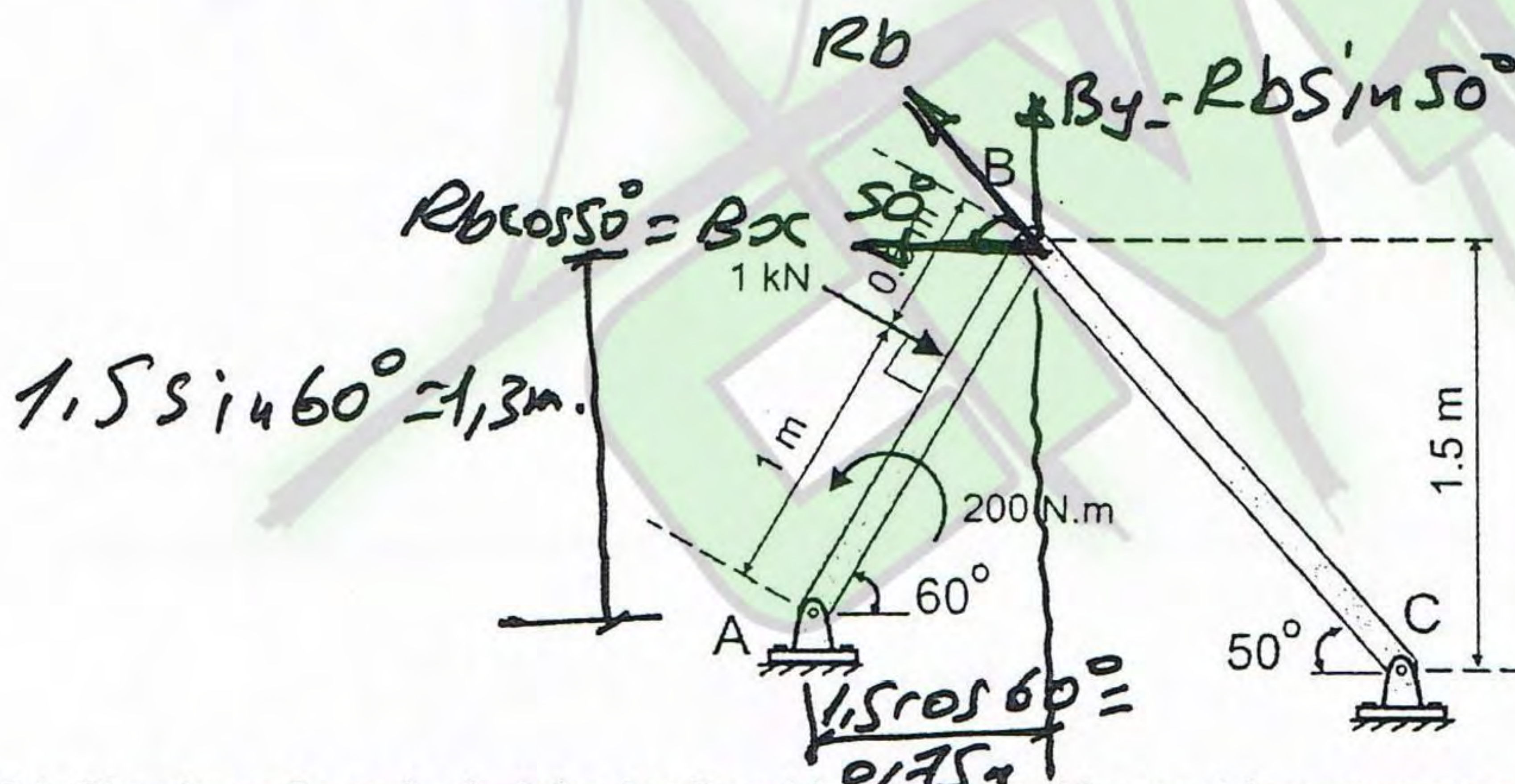
$$-200 \cdot 0.15 + 0.49T \cdot 0.8 = 0$$

$$T = \frac{200 \cdot 0.15}{0.49 \cdot 0.8} = \dots$$



Q3- The door shown is supported by a cable between points C and D, and two hinge supports fitted at points A and B. Given that the door has a weight of 200 N, determine the force in the cable. Assume the door has a constant thickness.

T_{CD} is: 255.1 N (6 marks)



Q4- The above frame is pin-jointed at B and it is supported by two hinge supports at A and C. The frame is subjected to the shown force and couple moment. Determine the horizontal and vertical components of the internal force at pin B. Ignore the weights of members AB and BC.

B_x : 364.7 N B_y : 434.64 N (6 marks)

$$\sum M_a = 0$$

$$-R_b \sin 50^\circ \cdot 0.75 - R_b \cos 50^\circ \cdot 1.3 + 1000 \cdot 1 - 200 = 0$$

$$-1.41 R_b + 800 = 0$$

$$R_b = \frac{800}{1.41} = 567.38 \text{ N}$$

$$B_y = 567.38 \cdot \sin 50^\circ = 434.64 \text{ N}$$

$$B_x = 567.38 \cdot \cos 50^\circ = 364.7 \text{ N}$$

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Statics

-Second Exam- 23rd April 2011

(B)

1- Answer all questions and show your calculations clearly and in details on the additional A4 paper.

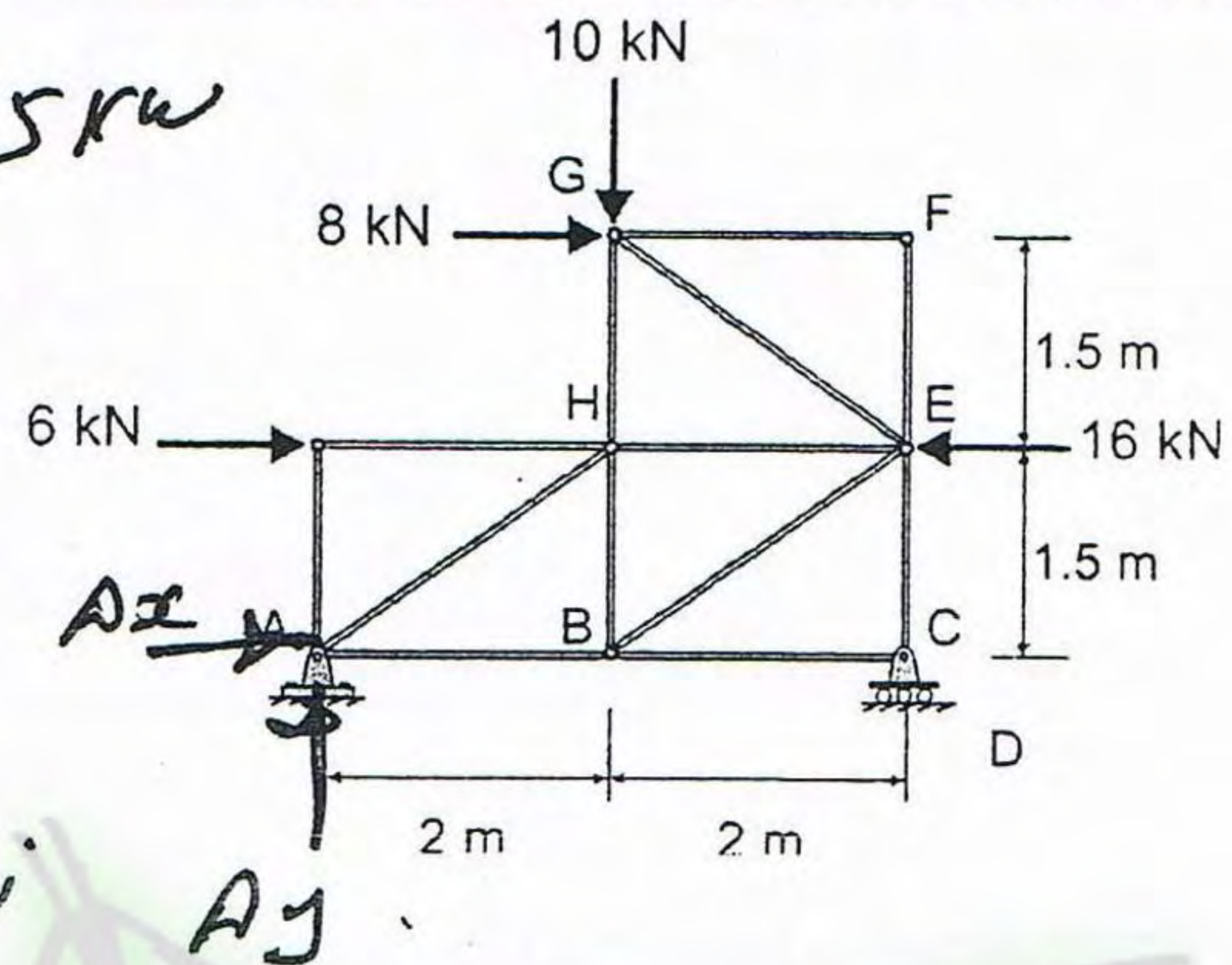
2- A Final answer without a solution will get NO marks

ملاحظة مهمة: يجب تسليم كراس الحل مع ورقة الامتحان معاً بعد نقل الأجوبة النهائية إلى الأماكن المخصصة على ورقة الامتحان

$\sum M_C = 0$
 $A_y = + \frac{10 \cdot 1.5 + 8 \cdot 3 + 10 \cdot 2}{4} = 2,75 \text{ kN}$

Q1- For the truss subjected to the shown forces, the horizontal and vertical components of the reaction at A are:

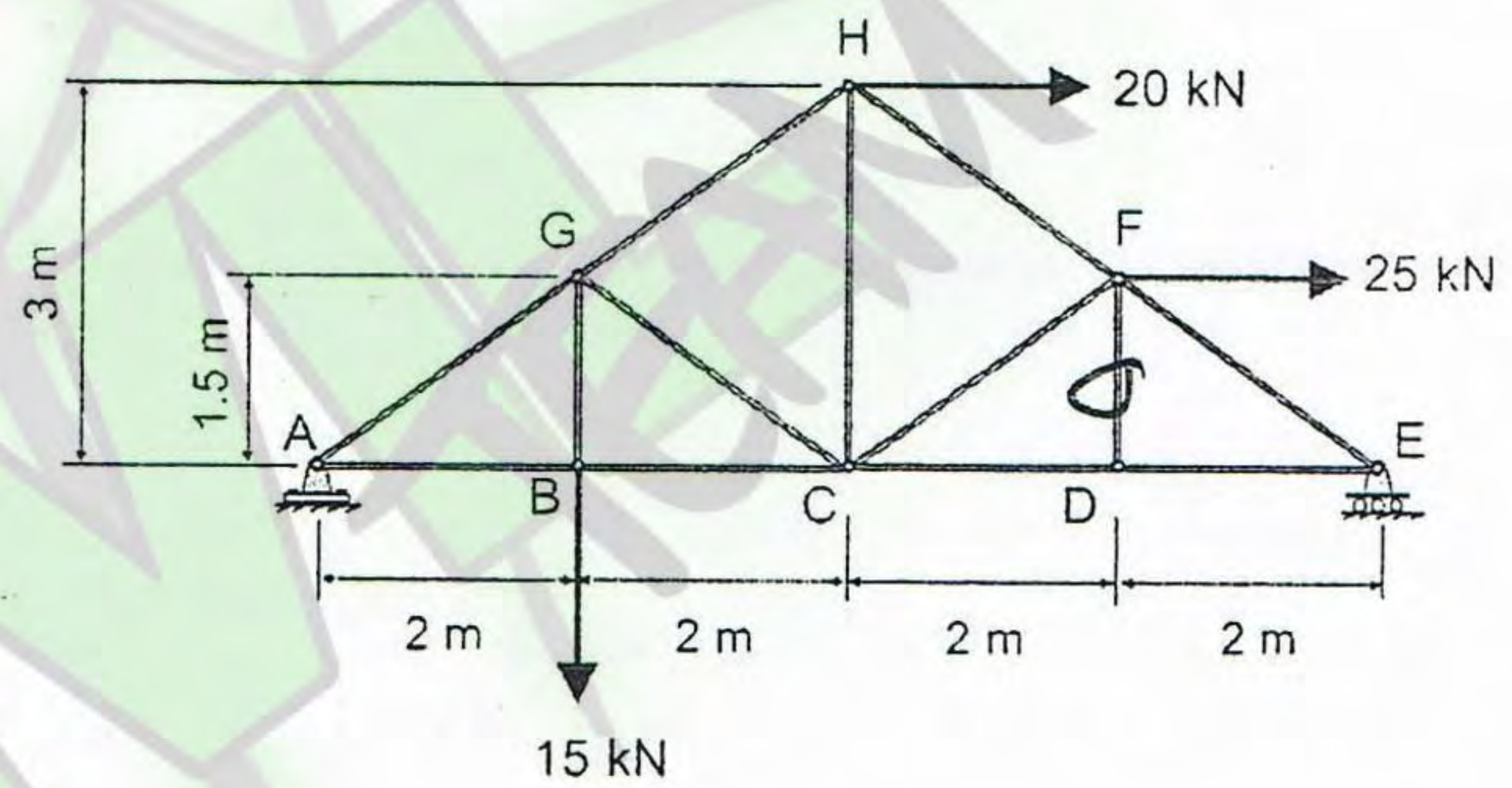
$A_x = 2 \text{ kN}$, $A_y = 2,75 \text{ kN}$ (3 marks)



$\sum F_x = 0 \Rightarrow A_x = 16 - 6 - 8 = 2 \text{ kN}$

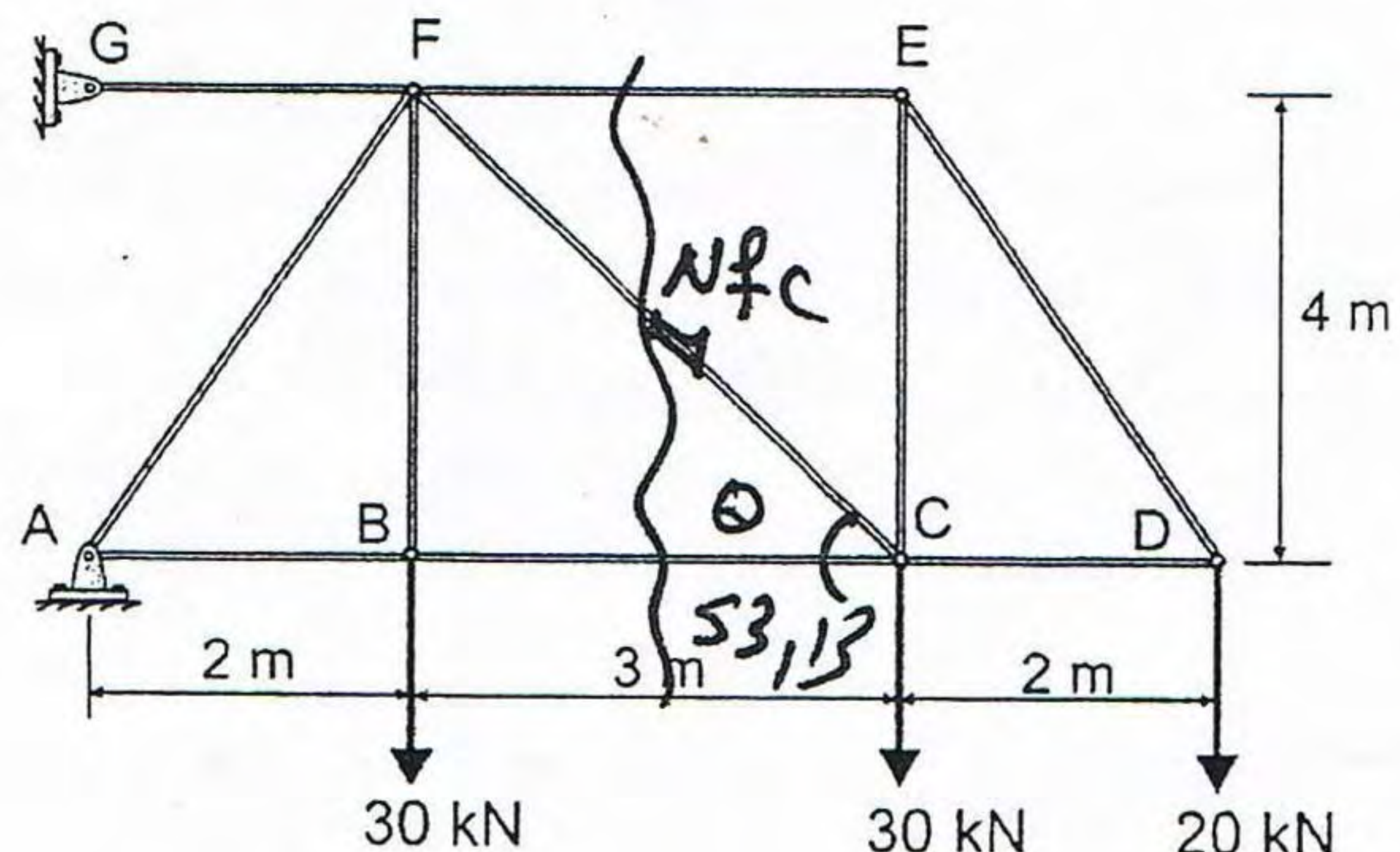
Q2- For the truss subjected to the shown forces, the internal force in member FD is:

$F_{FD} = \text{zero member}$ (3 marks)




Q3- For the truss subjected to the shown forces, the internal force in member FC is:

$F_{FC} = 62,5 \text{ kN}$ (3 marks)



$\sum F_y = 0$
 $N_{FC} \sin 53,13 - 30 - 20 = 0$
 $N_{FC} = \frac{50}{\sin 53,13} = 62,5 \text{ kN}$

$\theta = \tan^{-1} \frac{4}{3} = 53,13$

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رقم الطالب :		
وقت المحاضرات :		

B

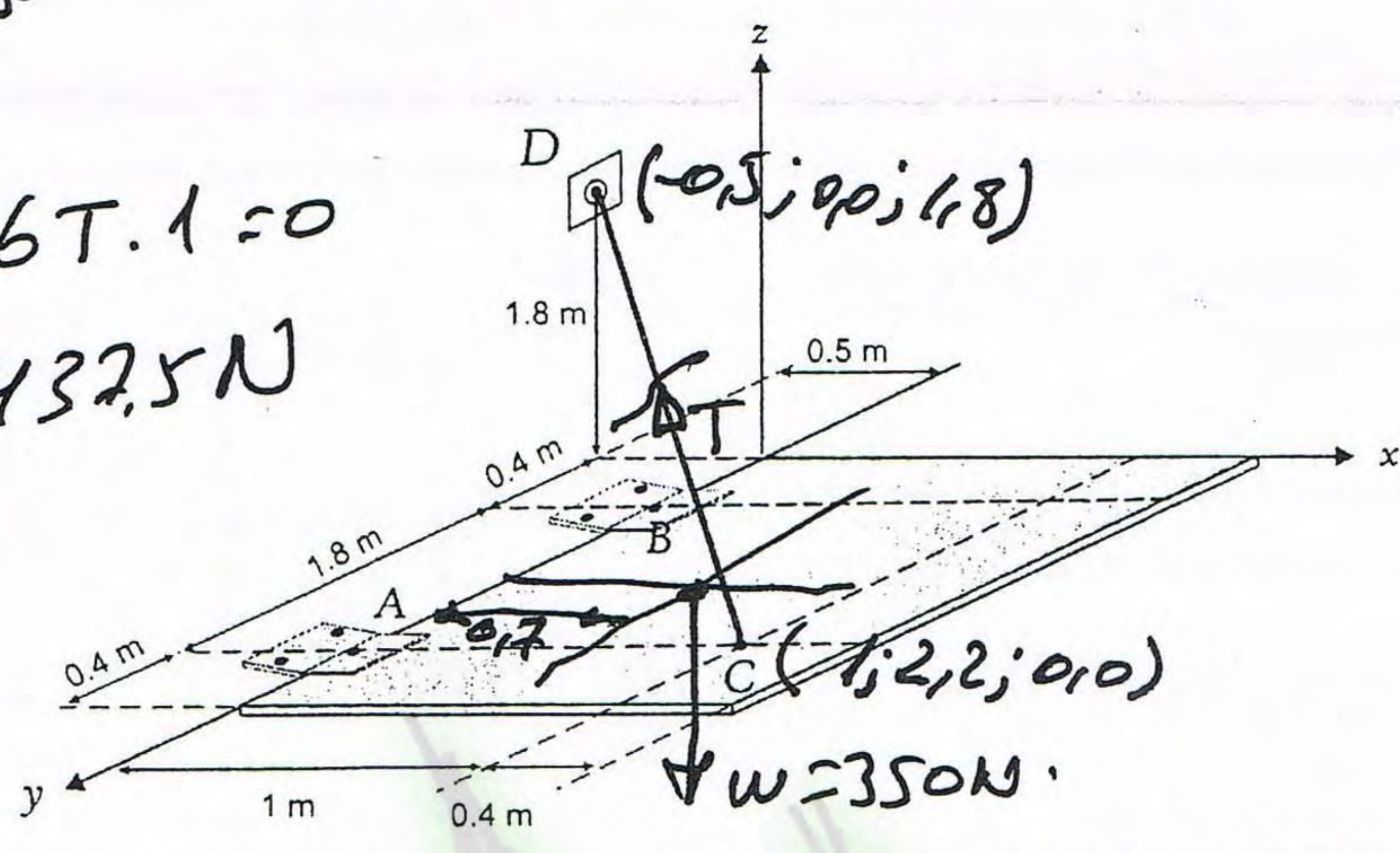
$$\vec{w} = (350 \text{ k}) \text{ N}$$

$$\vec{T} = \frac{T}{\sqrt{1.5^2 + 2.2^2 + 1.8^2}} (-1.5\hat{i} - 2.2\hat{j} + 1.8\hat{k}) = (-0.47\hat{i} - 0.68\hat{j} + 0.56\hat{k})T$$

$$\sum M_{ab} = 0$$

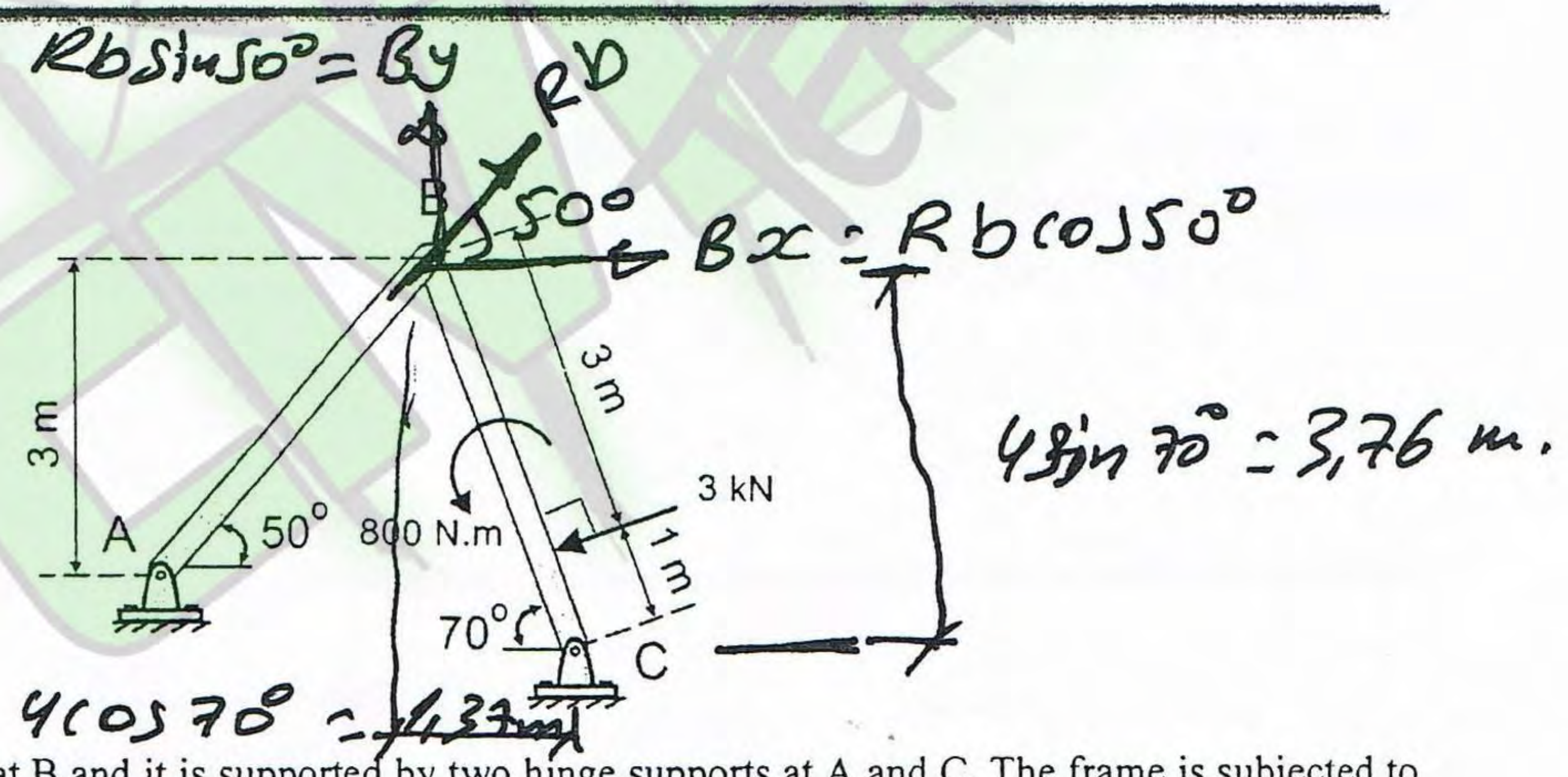
$$-350 \cdot 0.7 + 0.56T \cdot 1 = 0$$

$$T = \frac{350 \cdot 0.7}{0.56} = 437.5 \text{ N}$$



Q3- The door shown is supported by a cable between points C and D, and two hinge supports fitted at points A and B. Given that the door has a weight of 350 N, determine the force in the cable. Assume the door has a constant thickness.

T_{CD} is: 437.5 N (6 marks)



Q4- The above frame is pin-jointed at B and it is supported by two hinge supports at A and C. The frame is subjected to the shown force and couple moment. Determine the horizontal and vertical components of the internal force at pin B. Ignore the weights of members AB and BC.

B_x : 704.73 N B_y : 839.86 N (6 marks)

$$\sum M_C = 0$$


$$R_b \cos 50^\circ \cdot 3.76 + R_b \sin 50^\circ \cdot 1.37 - 3000 \cdot 1 - 800 = 0$$

$$3.466 R_b - 3800 = 0$$

$$R_b = \frac{3800}{3.466} = 1096.36 \text{ N}$$

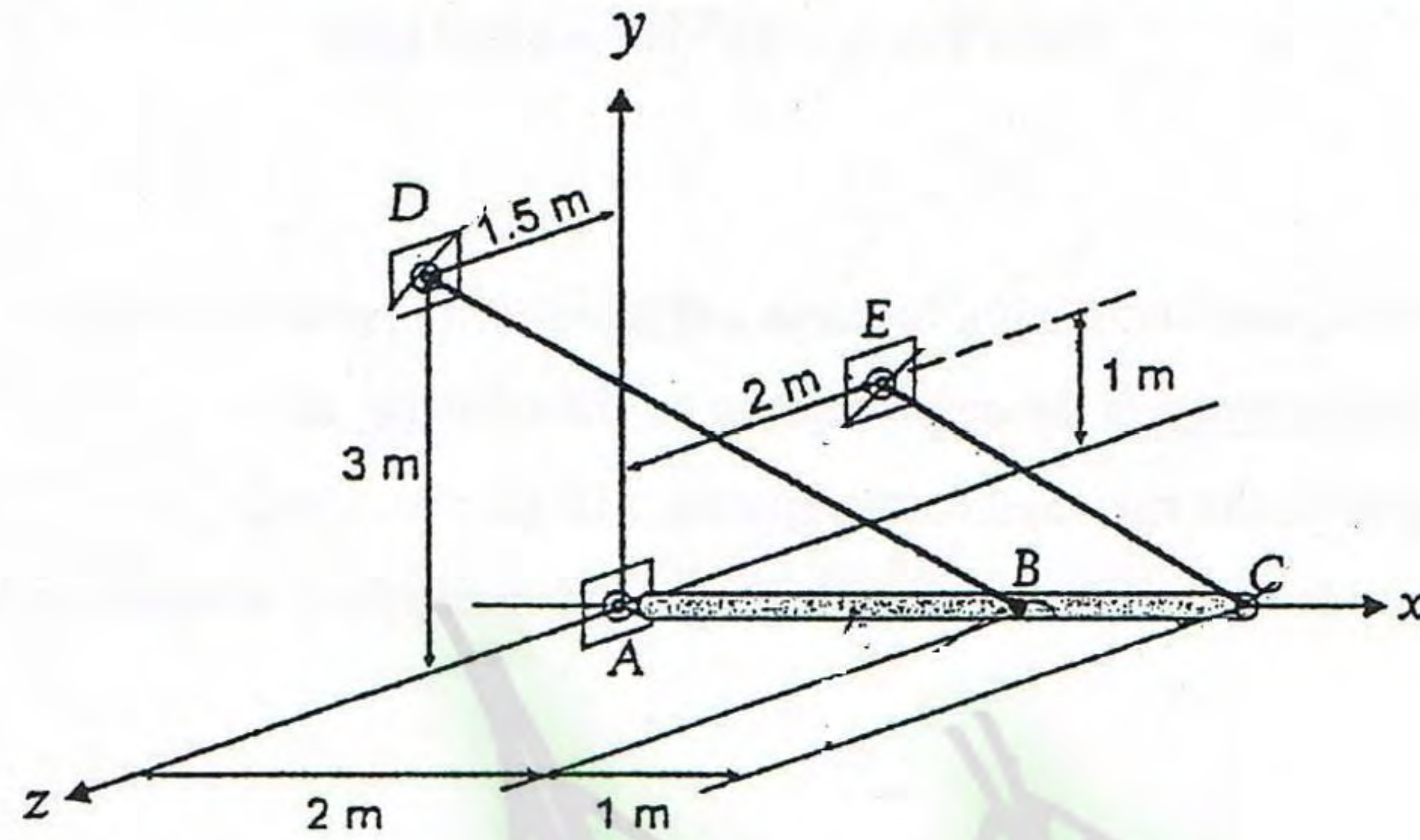
$$B_x = 1096.36 \cos 50^\circ = 704.73 \text{ N}$$

$$B_y = 1096.36 \sin 50^\circ = 839.86 \text{ N}$$

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Statics - Second Exam – 27th July 2010

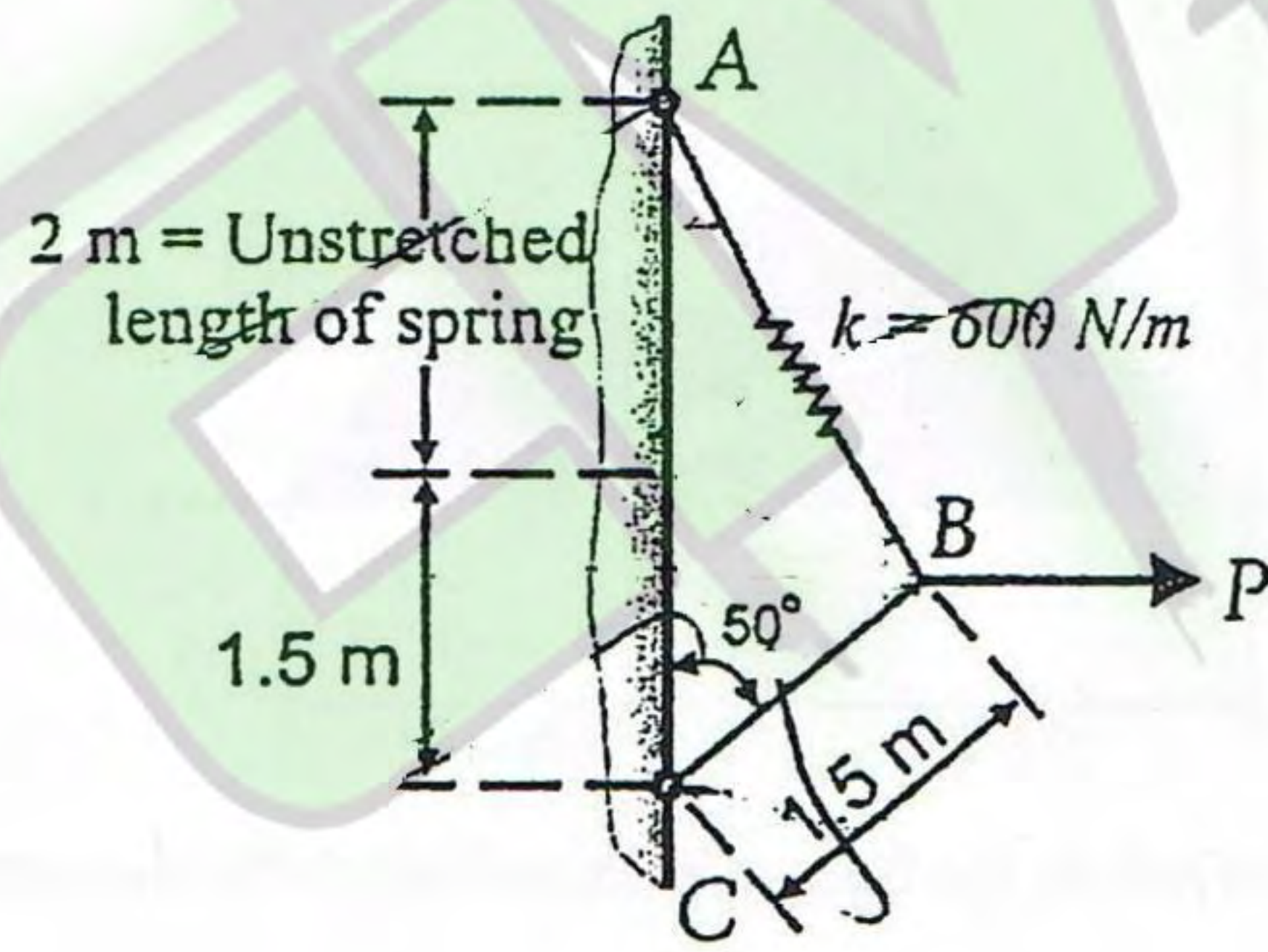
Exam duration: 50 minutes



Q 1- The uniform bar has 30-kg mass and it is supported by a ball-and-socket support at A and two cables; *BD* and *CE*, attached to the vertical wall as shown. Determine the tension in each cable, ($g = 9.81\text{m/s}^2$). (10 Marks)


1.1 T_{BD} is:

1.2 T_{CE} is:



Q 2- The unstretched length of the spring *AB* is 2 m. The equilibrium position of the cable *BC* and the spring under an applied force *P* is shown above. Determine *P*. (10 Marks)

2.1 *P* is:

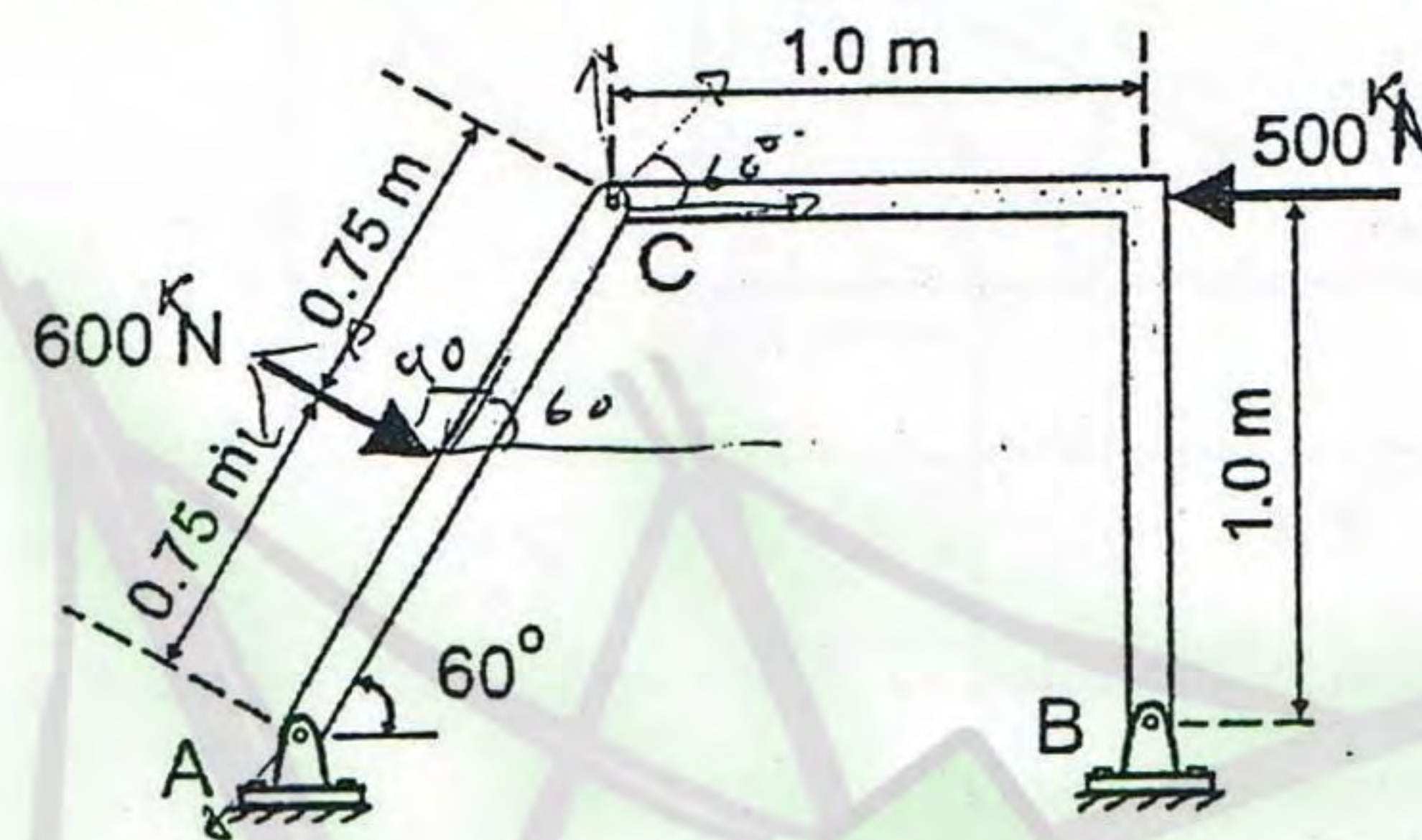
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رقم الطالب :	إسم الطالب :
وقت المحاضرات :	مدرس الشعبة :

Statics- Second Exam – 19th December 2009

Exam duration: 50 minutes


Instructions:

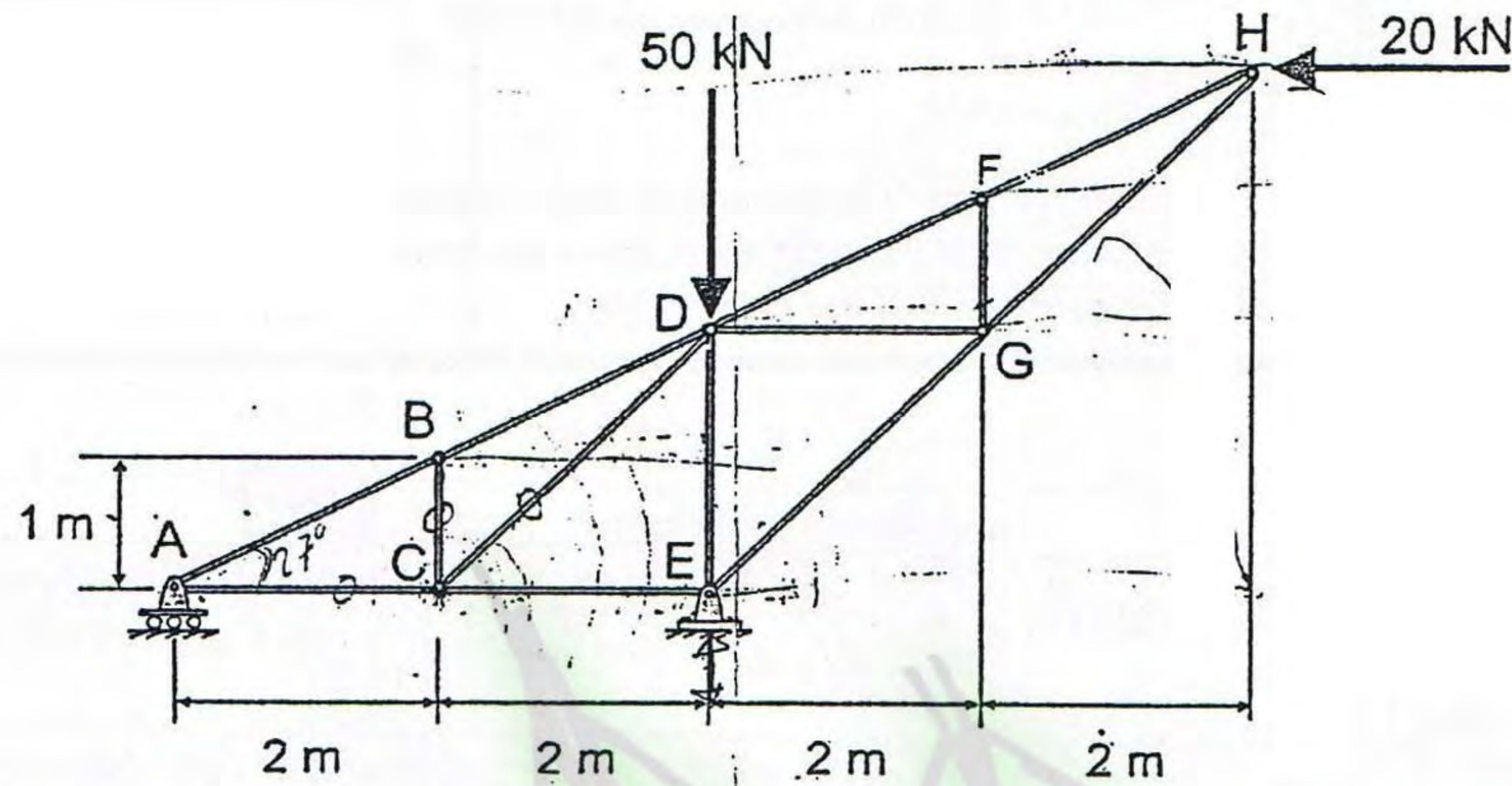
1. Write your name, number, lecturer's name and lectures' times on all pages.
2. Choose one correct answers on the exam paper, more answers will get zero mark for the question.
3. Hand in only this paper at the end of the exam.



Q 1- The frame shown above is subjected to two forces: a 600 N force that is perpendicular to member AC and a 500 N horizontal force. The weight and thickness of members AC and CB can be neglected. For each question, choose the correct answer or fill in the empty space in choice (F) : (9 Marks)

- 2.1 The horizontal reaction at A is:
- (A) 19.6 kN ← (B) Zero (C) 519 kN ← (D) 116.9 kN ←
 (E) 500 kN → (F)
- 2.2 The vertical reaction at A is:
- (A) 300 kN ↑ (B) 397.4 kN ↑ (C) 56.6 kN ↑ (D) 397.4 kN ↓
(E) 14.14 kN ↑ (F)
- 2.3 The horizontal force at pin C is:
- (A) 500 kN (B) 9.6 kN (C) 10.5 kN (D) 10.5 kN
(E) 402.6 kN (F)
- 2.4 The vertical force at pin C is:
- (A) 97.4 kN (B) 519.6 kN (C) 19.2 kN (D) 39 kN
(E) 36 kN (F)
- 2.5 The horizontal reaction at B is:
- (A) 500 kN → (B) 25.3 kN → (C) 24.3 kN ← (D) 97.4 kN →
(E) 50 kN → (F)
- 2.6 The vertical reaction at B is:
- (A) 97.4 kN ↑ (B) 97.4 kN ↓ (C) 197.4 kN ↑ (D) Zero
(E) 50 kN ↑ (F)

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رقم الطالب :	إسم الطالب :
وقت المحاضرات :	مدرس الشعبة :



Q 2- For the shown truss that is subjected to 50 kN and 20 kN forces. For each question, choose the correct answer or fill in the empty space in choice (F) : (12 Marks)

2.1 The reactions at E are:

- (A) 20 kN \rightarrow , 40 kN \uparrow (B) 30 kN \rightarrow , 50 kN \uparrow (C) 50 kN \rightarrow , 30 kN \uparrow (D) 20 kN \leftarrow , 50 kN \downarrow
 (E) 20 kN \rightarrow , 30 kN \uparrow (F)

2.2 The force in member CE is:

- (A) 28.3 kN (C) (B) 40 kN (T) (C) 56.6 kN (T) (D) 40 kN (C)
 (E) 14.14 kN (T) (F)

2.3 The force in member CD is:

- (A) 22.7 kN (T) (B) 22.7 kN (C) (C) 10.5 kN (T) (D) 10.5 kN (C)
 (E) Zero (F)

2.4 The force in member DG is:


- (A) 33.5 kN (T) (B) 33.5 kN (C) (C) 19.2 kN (C) (D) 19.2 kN (T)
 (E) 36 kN (T) (F)

2.5 The force in member BD is:

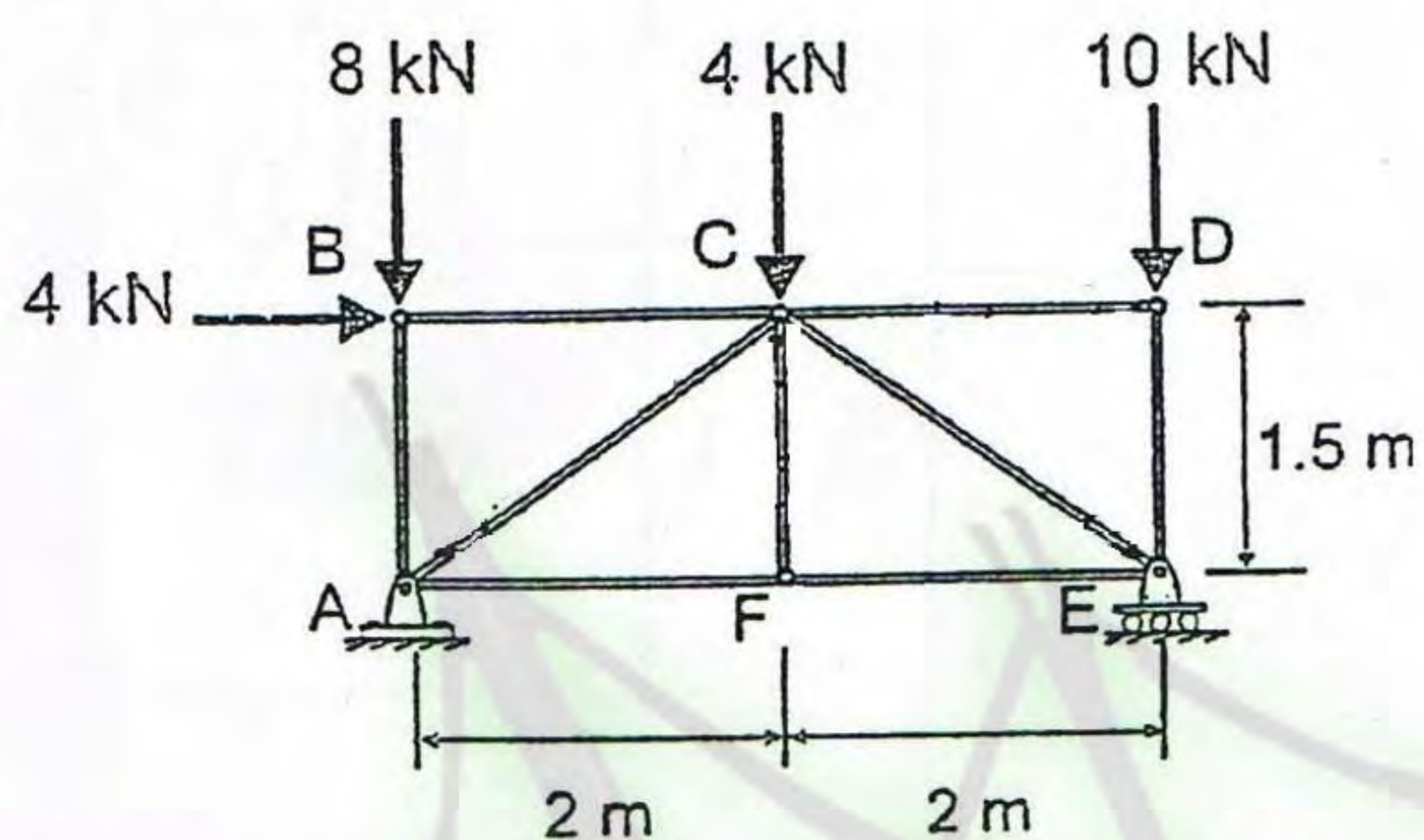
- (A) 40.8 kN (C) (B) 28.3 kN (T) (C) 24.3 kN (C) (D) 44.7 kN (C)
 (E) 50 kN (T) (F)

2.6 The force in member DE is:

- (A) 50 kN (C) (B) 20 kN (T) (C) 58.8 kN (C) (D) 44.7 kN (C)
 (E) 50 kN (T) (F)

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رقم الطالب	إسم الطالب
وقت المحاضرات :	مدرس الشئبة :

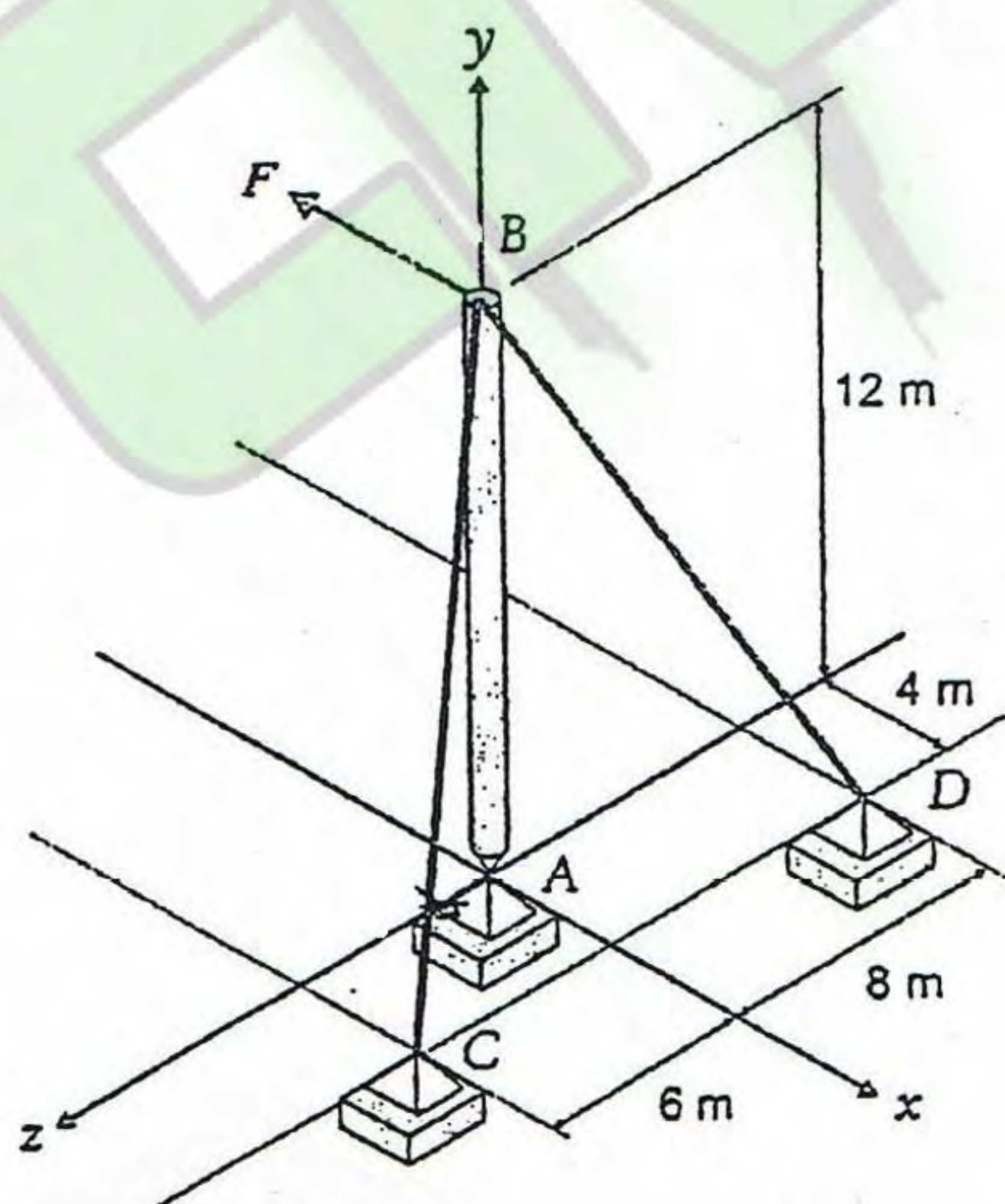
Statics- Second Exam – 19th December 2010
Exam duration: 50 minutes



Q 1- The above truss that is subjected to the shown forces. Given that support A is a hinge and support E is a roller, determine the following:

- 1.1 The force in member CF is:
- 1.2 The force in member AC is:
- 1.3 The force in member CD is:
- 1.4 The force in member CE is:

(10 Marks)




Q 2- The pole is supported by a ball and socket joint at its base A, and it is tied by two cables to points C and D. The pole is subjected to force $F = 140$ N force parallel to the x axis. Determine the tension in cable BD:

T_{BD} is:

(10 Marks)

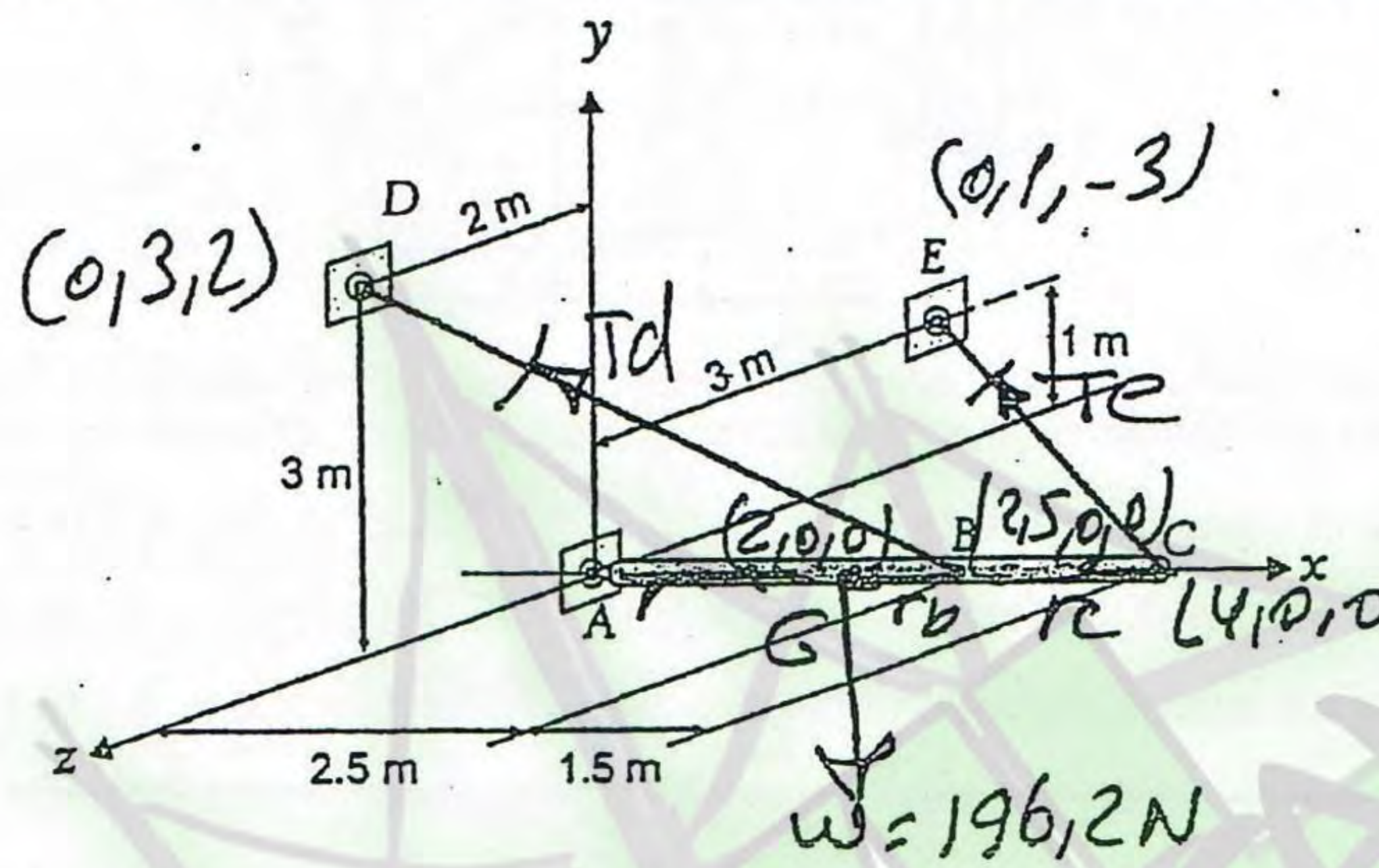
(A) $\rightarrow A+B$

الإجابة النموذجية
لاعتجان الشانجا

Al-Balqa' Applied University Faculty of Engineering Department of Road and Bridge Engineering	
رقم الطالب :	إسم الطالب :
وقت المحاضرات :	مدرس الشعبة :

Statics - Second Exam - 27th July 2010

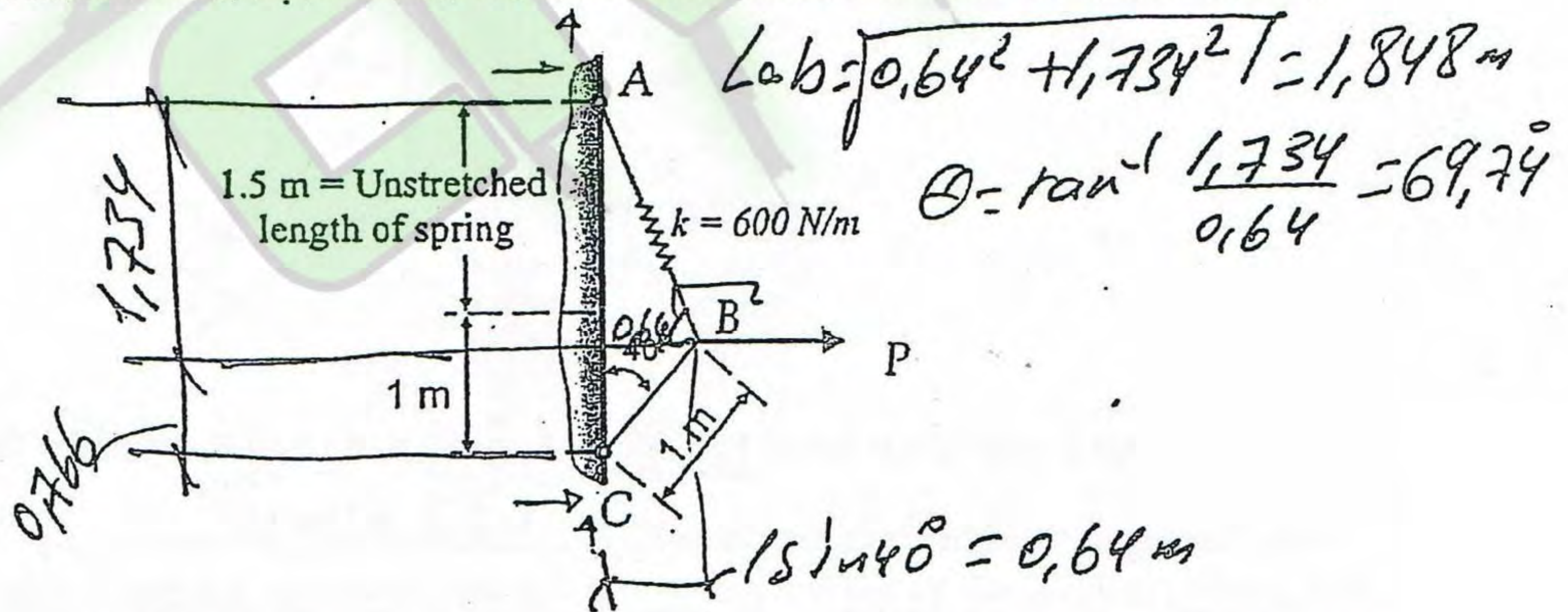
Exam duration: 50 minutes



Q 1- The uniform bar has 20-kg mass and it is supported by a ball-and-socket support at A and two cables; BD and CE, attached to the vertical wall as shown. Determine the tension in each cable, ($g=9.81\text{m/s}^2$). (10 Marks)


1.1 T_{BD} is: ... 187.74 N

1.2 T_{CE} is: ... 91.58 N



Q 2- The unstretched length of the spring AB is 1.5 m. The equilibrium position of the cable BC and the spring under an applied force P is shown above. Determine P. (10 Marks)

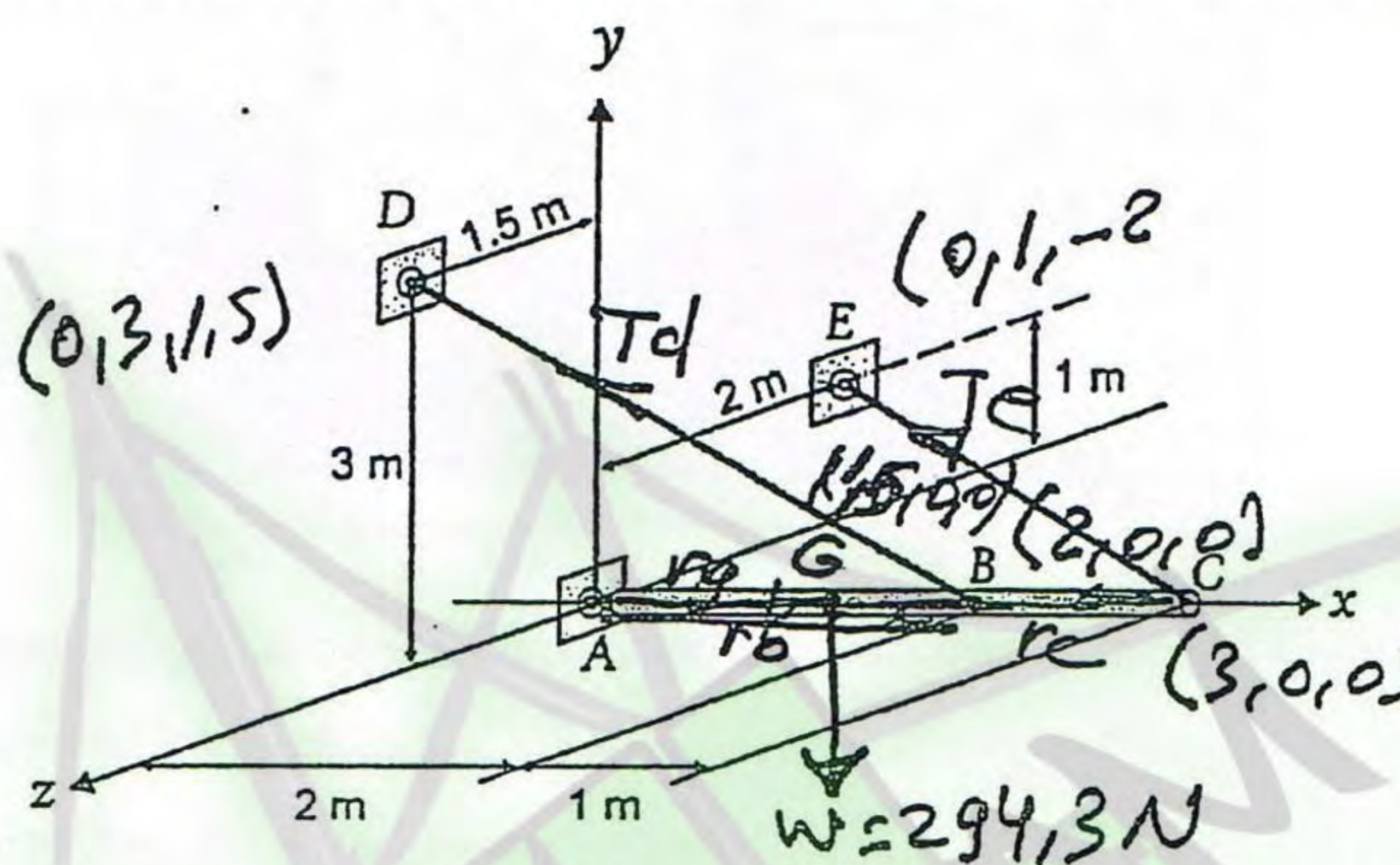
2.1 P is: ... 236.67 N

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وقت المحاضرات :	مدرس الشعبة :

(B)

Statics - Second Exam - 27th July 2010

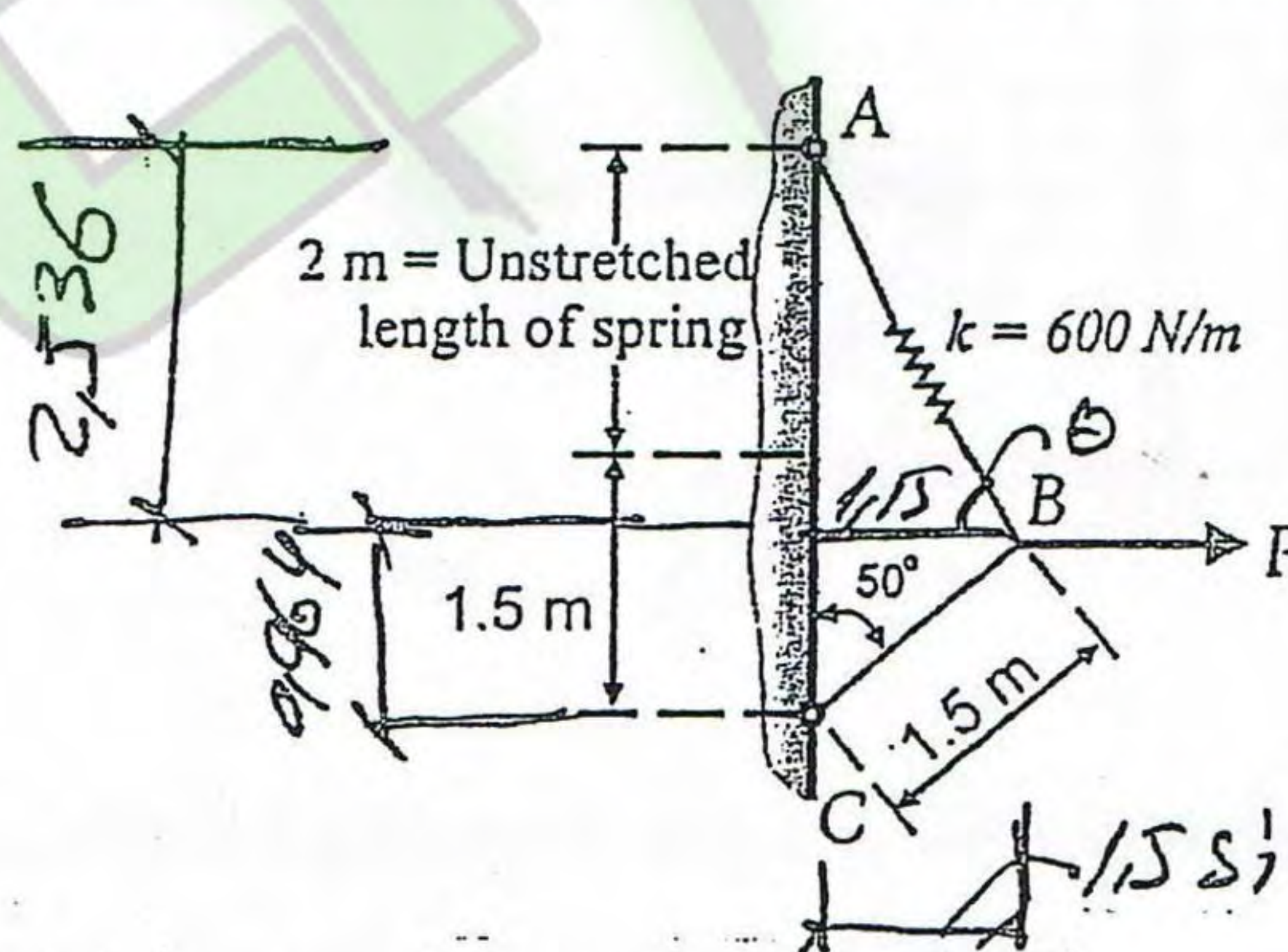
Exam duration: 50 minutes



Q 1- The uniform bar has 30-kg mass and it is supported by a ball-and-socket support at A and two cables; BD and CE, attached to the vertical wall as shown. Determine the tension in each cable, ($g = 9.81 \text{ m/s}^2$). (10 Marks)

1.1 T_{BD} is: ...228.73 N

1.2 T_{CE} is: ...109.79 N



$$L_{AB} = \sqrt{1.5^2 + 2.536^2} = 2.785$$

$$\theta = \tan^{-1} \frac{2.536}{1.5} = 65.61$$

$$1.5 \sin 50 = 1.15$$

Q 2- The unstretched length of the spring AB is 2 m. The equilibrium position of the cable BC and the spring under an applied force P is shown above. Determine P. (10 Marks)

2.1 P is: ...705.72...