



**GNG 1105
ENGINEERING MECHANICS**

Final Examination
13 December 2010
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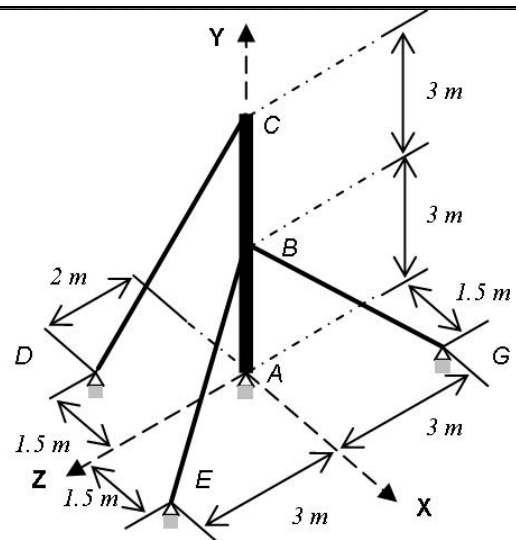
Time: 3 hrs
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Closed Book Examination. Programmable calculators are not allowed.
Free-body diagrams must be drawn where appropriate.

Problem 1 (16/60)

Mast ABC is being supported by a ball-and-socket joint at base A and by three cables BE, BG and CD as shown.

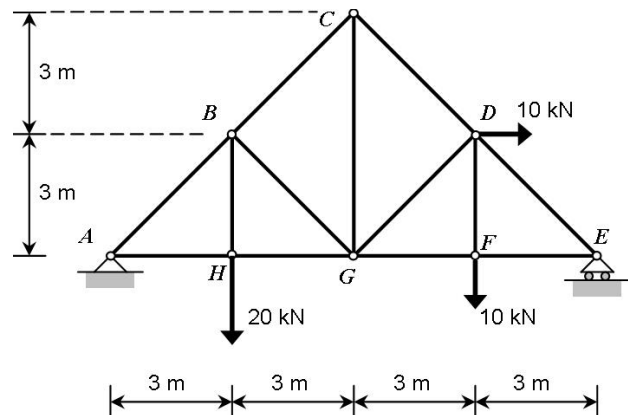
- Draw the free-body diagram for mast ABC
- Write the tensions in cables BE, BG and CD in vector form.
- If the tension in cable CD is 500 N, determine the tensions in cables BE and BG.



Problem 2 (11/60)

For the truss shown and assuming that all joints are pinned,

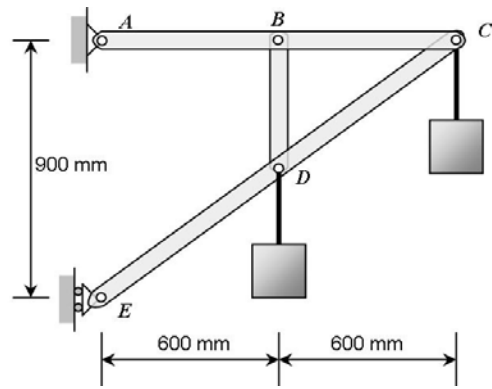
- Calculate the reactions at supports A & E.
- Determine the forces in members CD, GD and GF using the method of sections. State whether each member is in tension or compression.



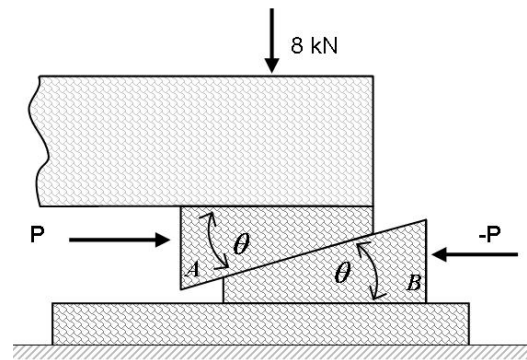
Problem 3 (11/60)

Two boxes are hanging from the frame shown to the right. The mass of each of these boxes is 30 Kg.

- Determine the reactions at the supports A and E.
- Determine all the forces acting on member ABC.

**Problem 4 (11/60)**

To level a wood deck, wood wedges A & B are placed under a corner of the deck. Wedge B rests on a wood board as shown, and a bar clamp is used to apply equal opposite forces to the wedges. The load transmitted from the deck to the wedges is 8 kN. Knowing that $\theta = 18^\circ$ and that the coefficient of static friction between all wood surfaces is 0.35 and between the board and the ground is 0.6, determine the magnitude of P of the clamping forces for which upward motion of the deck is impending.

**Problem 5 (11/60)**

A projectile is fired from point A, located at $h_0 = 2\text{ m}$ above the ground, with an initial velocity v_0 and at an angle $\alpha = 50^\circ$.

- What should be the minimum value of v_0 for the projectile to clear the wall if its height is $H = 5\text{ m}$?
- For the value of v_0 obtained in part (a), determine the distance L that separates point A from the wall.

