Name_____
ID Number_____

GNG 1100 - ENGINEERING MECHANICS

Mid-term Examination — Time: 75 minutes
19 October 2006 — Page 1 of 3
Prof. W. Hallett — Version A

Closed book. Non-programmable calculators only allowed. Answer all questions on this question paper, using the back of the paper if necessary. **DO NOT SEPARATE THE PAGES, DO NOT ADD EXTRA SHEETS.** Put your name on each page. Draw free-body diagrams where applicable.

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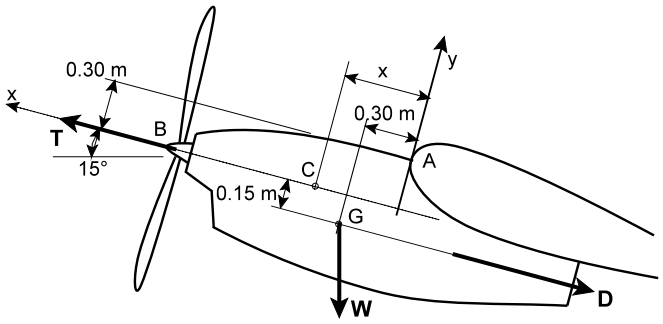
1. (12 marks total) The sketch shows an aircraft engine attached to the wing of a plane which is climbing at an angle of 15°. The forces on the engine are the engine thrust T = 15 kN, the weight W = 5 kN, and the aerodynamic drag D = 1.5 kN.
(a) (8 marks) Reduce these forces to an equivalent force-couple system at the engine mounting point A.
(b) (4 marks) Reduce these forces to a single resultant force and determine the location x of the point C where the line of action of this force intersects the line BC.



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GNG 1100 B - ENGINEERING MECHANICS

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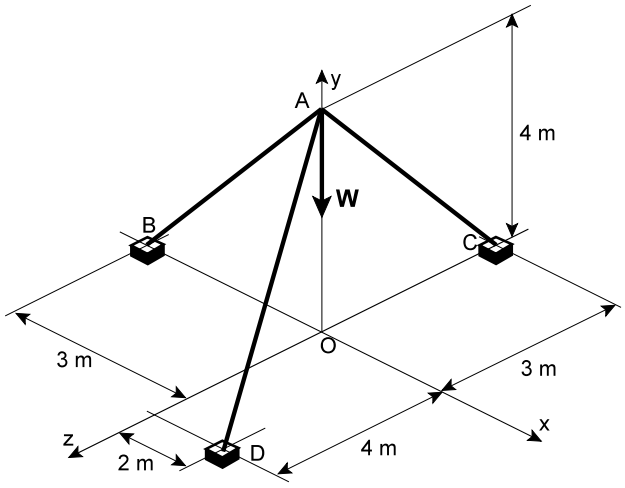
2. (11 marks total) A weight W = 2.1 kN is supported by a tripod of three bars arranged as shown.
(a) (6 marks) Write the forces in bars BA, CA and DA as vectors.
(b) (5 marks) Determine the forces in BA, CA and DA.



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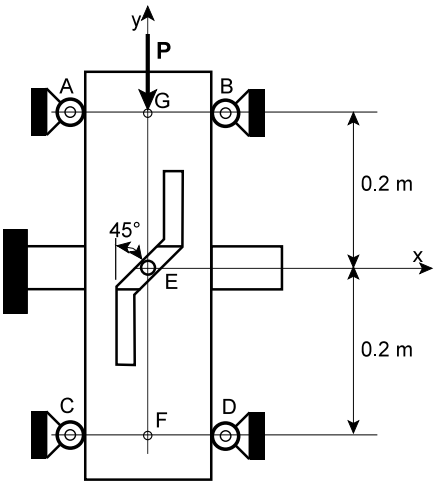
3. (7 marks) A vertical slide is guided by four frictionless rollers A, B, C and D. The slide is supported by a frictionless pin E in an angled slot. The pin is attached to a rigid horizontal bar as shown. The slide is subjected to a force P = 100 N. The weight of the slide may be neglected.
(a) (3 marks) Determine the force exerted by pin E on the slide.
(b) (4 marks) Determine the forces exerted by the rollers on the slide. Note that only one roller of A and B and only one of C and D will actually act on the slide.



Total Marks for this paper: 30