Université d'Ottawa
Faculté de génie

Département de
génie civil

uOttawa

L'Université canadienne
Canada's university

University of Ottawa
Faculty of Engineering

Department of
Civil Engineering

CVG 2140: Mechanics of Materials I

Midterm Exam / Examen de mi-session **February/ Février 22, 2010**
Mr. B. Shadravan / Dr. B. Martín-Pérez Time / Temps: **80 min.**

CLOSED BOOK. Attempt all three problems. Non-programmable calculators are allowed. Marks are as shown for each question. Clearly indicate the **coordinates** you are using.

LIVRE FERMÉ. Essayez de répondre aux trois questions. On permet des calculatrices non programmables. Les points sont indiqués pour chaque question. Identifiez clairement le **système de coordonnées** que vous utilisez.

Name of the student / Nom de l'étudiant: _____

Student Number / Numéro d'étudiant: _____

1. The beam illustrated in Fig. 1 is composed of segments AB and BD, which are connected by pin B.
    a. Determine the support reactions at A and C (10 points)
    b. Draw the shear and bending moment diagrams (20 points)

2. Determine the maximum and minimum moments of inertia of the shape illustrated in Fig. 2 with respect to its centroidal axes. All dimensions are in mm. (30 points).

3. The rod ABC illustrated in Fig. 3 is fixed at point A and subjected to a tensile load of 4 kN at point C. It has a circular cross section, with a diameter of 60 mm for segment AB and of 20 mm for segment BC. The rod is made of aluminum with E = 70 GPa.
    a. Determine the load P applied at B so that the displacement of point C is zero (15 points)
    b. Calculate the displacement of B relative to A (15 points)

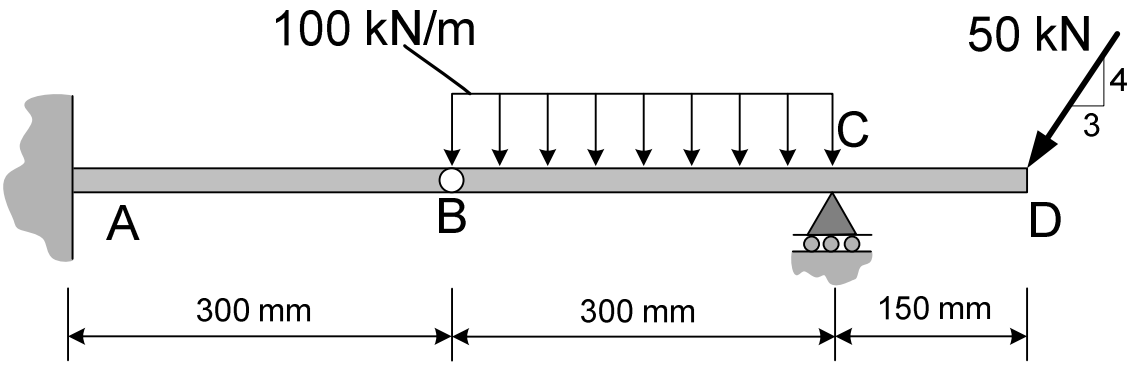

Figure 1

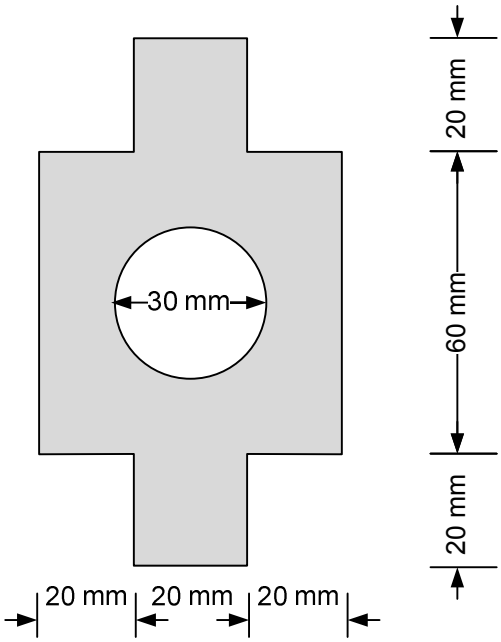

Figure 2

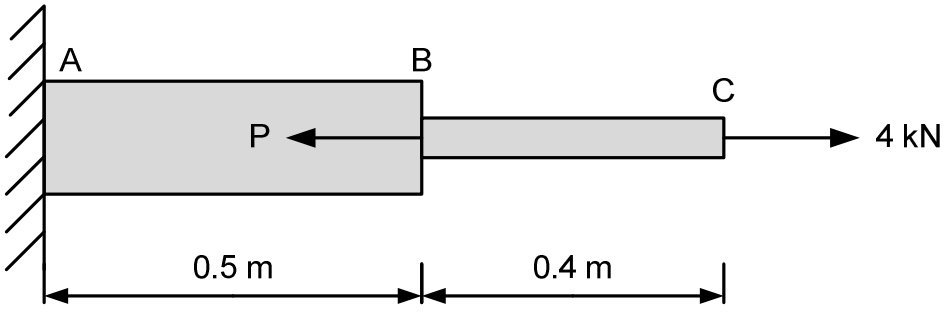

Figure 3