# QUIZ 1
## Spring 2004-2005
(Tuesday April 12, 2005)
## CIVE311 – STRUCTURES I
## CLOSED BOOK, 1 & 1/2 HOURS

**Name:** _____ **ID#:** _____

***NOTES***

- 3 PROBLEMS – 13 PAGES.
- ALL YOUR ANSWERS SHOULD BE PROVIDED ON THE QUESTION SHEETS.
- **ONE EXTRA SHEET IS PROVIDED AT THE END.**
- **ASK FOR ADDITIONAL SHEETS IF YOU NEED MORE SPACE.**
- SOME ANSWERS MAY REQUIRE MUCH LESS THAN THE SPACE PROVIDED.
- ***DO NOT*** USE THE BACK OF THE SHEETS FOR ANSWERS.
- DRAFT BOOKLET WILL BE PROVIDED; BUT DO NOT USE FOR ANSWERS.
- BOTH QUESTION SHEETS AND DRAFT BOOKLET SHOULD BE RETURNED.
- CHECK BOXES ARE TO CONFIRM THAT YOU HAVE SOLVED A QUESTION. ☑

***YOUR COMMENT(S)***

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

---

DO NOT WRITE IN THE SPACE BELOW

***MY COMMENT(S)***

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

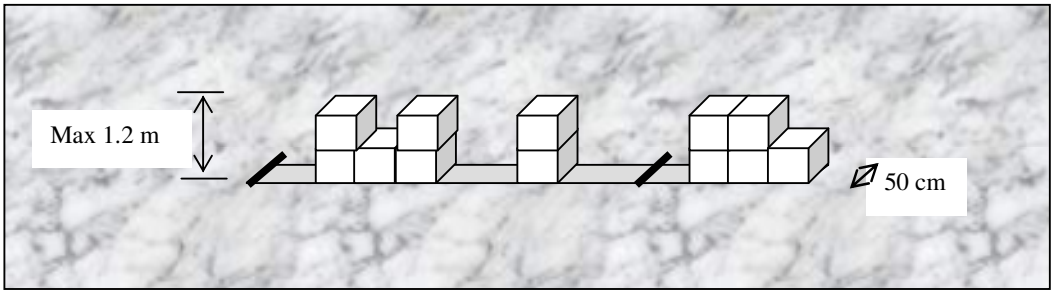
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

***YOUR GRADE***

*Problem I:* _ _ _ /30
*Problem II:* _ _ _ /20
*Problem III:* _ _ _ /50
*Other:* _ _ _
_____

***TOTAL:*** /100

## **Problem I:** *(30 points)*



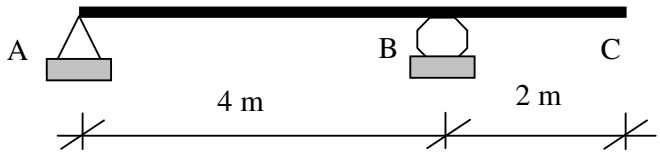




Figure I

The shelf in Figure I is supported as shown. The shelf is to carry a maximum of 12 cubic boxes (shown arbitrarily distributed in the figure) at any one time, each sized 50x50x50 cm and having a density of 20 kN/m$^3$. Ignore the own weights of the shelf and its supports.

Compute the maximum absolute vertical reaction $\boldsymbol{R_A}$ and sketch the corresponding distribution of boxes on the shelf for each of the following conditions:

1. One level of boxes is allowed, and boxes are fully spread between A and C. ☐
2. One level of boxes is allowed. ☐
3. More than one level of boxes is allowed. ☐

Compare results from conditions 1 to 3 and ***briefly*** comment. ☐

Calculations and/or Diagrams:

---

---

---

---

---

---

---

Calculations and/or Diagrams (cont'd):

## **Problem II:** *(20 points)*

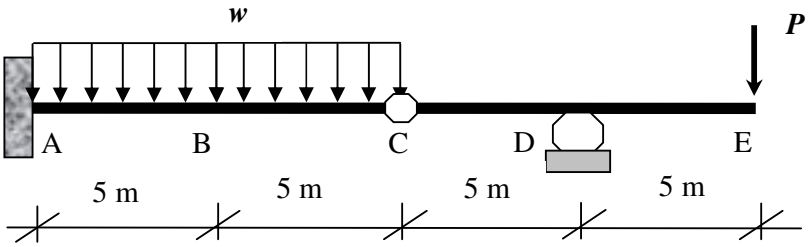
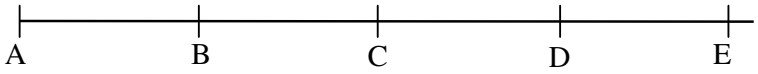



Figure II

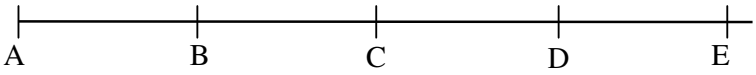
For the beam shown in Figure II, the own weight is neglected.
*Your diagrams/sketches should include any feature/value you think is relevant or important.*

Let ***w*=20 kN/m** and **P=80 kN**
Compute the ***reactions*** in the beam, and draw the ***shear*** and bending ***moment*** diagrams; sketch the ***deflected shape***. *(20 points)* ☐

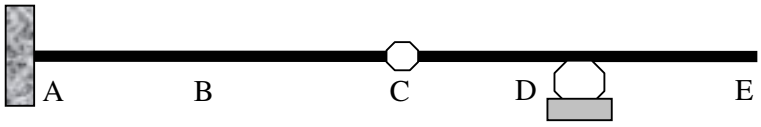
SHEAR:




MOMENT:




DEFLECTION:



Calculations and/or Diagrams (cont'd):

Calculations and/or Diagrams (cont'd):

**Problem III:** *(50 points)*

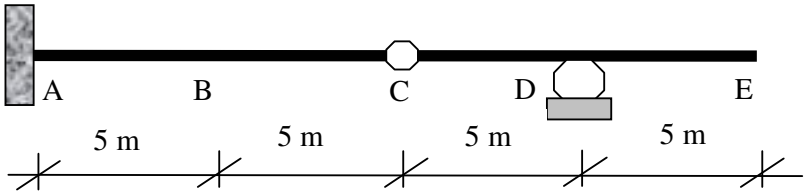



Figure III

1. Referring to Figure III, draw the influence lines for $\boldsymbol{R_A}$, $\boldsymbol{V_A}$, $\boldsymbol{V_D}$, $\boldsymbol{M_B}$, $\boldsymbol{M_C}$, and $\boldsymbol{M_D}$. Draw in the order which you find appropriate. *(25 points)* ☐

Calculations and Diagrams:

Calculations and Diagrams (cont'd):

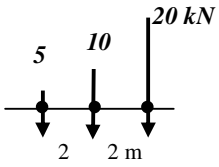
Calculations and Diagrams (cont'd):

2. Let $w_D$**=10 kN/m** (dead load); $w_L$**=20 kN/m** and $P$**=80 kN** (live loads)
   - Compute the maximum absolute value for $R_A$, and show the corresponding loading position. *(9 points)* ☐
   - Compute $R_A$ for $w_L$ on AC only and $P$ on E and compare with Problem II (do not include $w_D$). *(6 points)* ☐

Calculations and Diagrams:

Calculations and Diagrams (cont'd):

3. Compute the maximum absolute value of $M_B$ for the truck load shown, assuming that the truck can travel in either directions, and show the corresponding position(s) of the truck. *(10 points)*




Calculations and Diagrams:

## *EXTRA SHEET: Continued from page _____*

**Name:** _____ **ID#:** _____

Calculations and/or Diagrams: