QUIZ 1
Spring 2007-2008
(March 19, 2008)
CIVE311 – STRUCTURES I
CLOSED BOOK, 1 & 1/2 HOURS

Name: ______________________ **ID#:** ________________

NOTES

- 2 PROBLEMS– 14 PAGES.
- ALL YOUR ANSWERS SHOULD BE PROVIDED ON THE QUESTION SHEETS.
- **TWO EXTRA SHEETS 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:	_ _ _ /60
Problem II:	_ _ _ /40
Other:	_ _ _
TOTAL:	/100

Problem I (*for a student engineer*): *(60 points)*

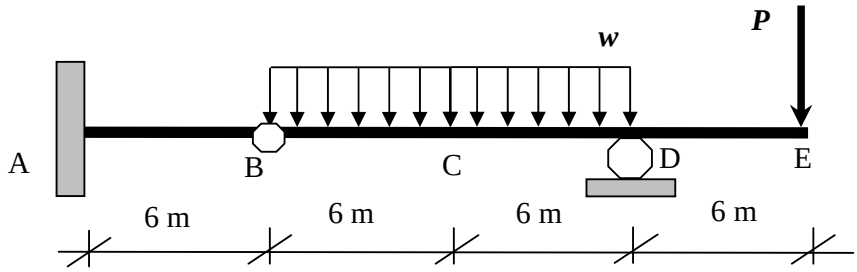
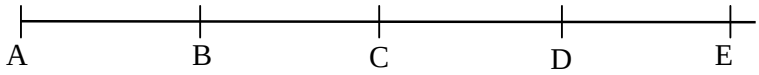


Figure I

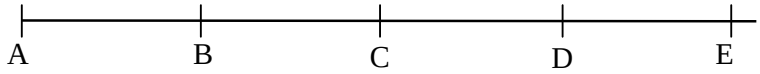
For the beam shown in Figure I, the own weight is neglected.
Your diagrams/sketches should include any feature/value you think is relevant or important.

1. Let ***w*=10 kN/m** and **P=20 kN**
   Compute the ***reactions*** (forces and moments) 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):

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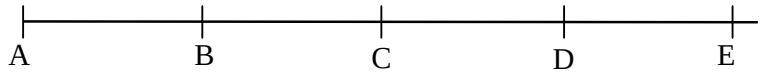
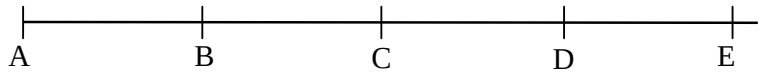
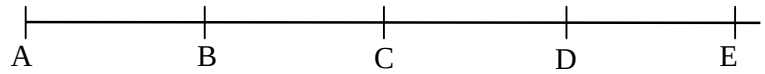
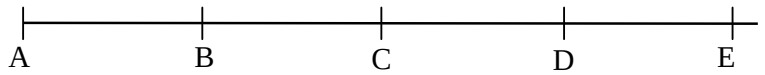
2. Referring to Figure I, draw the influence lines for $\boldsymbol{R_B}$, $\boldsymbol{R_D}$, $\boldsymbol{M_A}$, $\boldsymbol{M_B}$, $\boldsymbol{M_C}$, and $\boldsymbol{V_D}$. Draw in the order which you find appropriate. *(30 points)* ☐

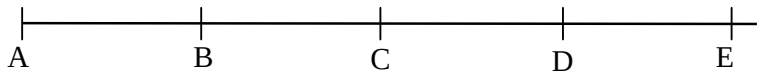
Calculations and Diagrams:

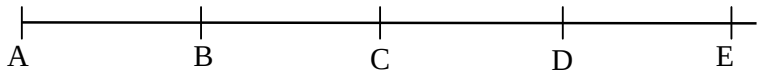












Calculations and Diagrams (cont'd):

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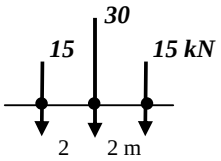
3. Compute the maximum value(s) of $\boldsymbol{M_C}$ for the truck load shown below, and show the corresponding position(s) of the truck. *(5 points)* ☐
   Compute the maximum absolute positive moment that can ever occur between B and D for the truck load shown below. Compare with maximum $\boldsymbol{M_C}$ and briefly comment *(5 points)* ☐



Calculations and Diagrams:

Problem II (*for a professional engineer*): *(40 points)*

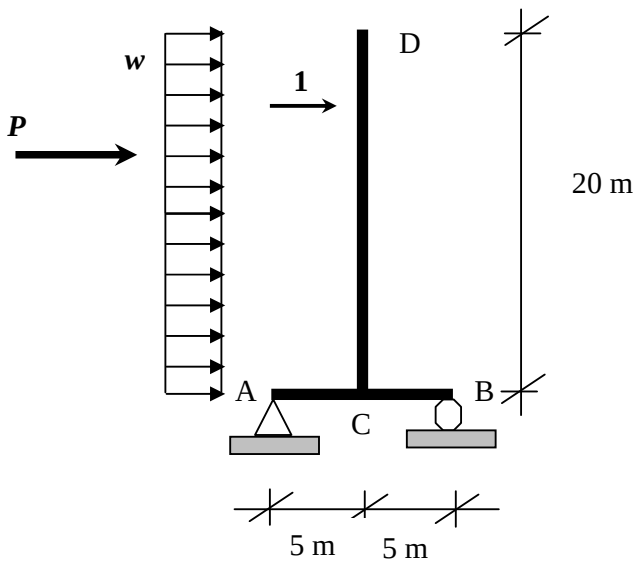


Figure II

The reinforced concrete beam AB supports a reinforced concrete column monument CD as shown in Figure II.

1. Assuming that a horizontal unit load moves on the vertical column CD as shown in the figure, draw the influence lines for the reactions at A and B, and for the moment in the beam at C. *(15 points)* ☐
2. For a combination of wind load ***w*=10 kN/m,** and an impact force from a flying object ***P*=50 kN** that can hit the column at any location between C and D, and not considering the own weight of the system, calculate the maximum vertical reaction at B (Assume that ***w*** and ***P*** can hit in either directions – i.e. left to right, or right to left-, and that they can occur either individually or simultaneously). *(15 points)* ☐
3. What should be the total weight of the system (beam and column) so that an uplift at B does not occur. In this case, choose a suitable square cross-section for the beam and column that will prevent the uplift (same cross-section for beam and column) given that the density of concrete is 25 kN/m^3. *(10 points)* ☐

Calculations and/or Diagrams:

Calculations and/or Diagrams (cont'd):

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EXTRA SHEET 2: Continued from page _____

Name: _____ **ID#:** _____

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EXTRA SHEET 2: Continued from page _____

Name: _____ **ID#:** _____

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