## QUIZ 1

Spring 2005-2006
(Wednesday March 22, 2006)
CIVE311 - STRUCTURES I
CLOSED BOOK, $1 \& 1 / 2$ HOURS
Name:
ID\#: $\qquad$

## NOTES

- 2 PROBLEMS - 16 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: _ _ _ 130
Problem II: _ _ _ $/ 70$
Other:

-     -         - 

TOTAL:
/100

## Problem I: (30 points)



Figure I

1. Referring to the weightless plane truss shown in Figure I, compute the reactions and the forces in members $\mathrm{EB}, \mathrm{BC}, \mathrm{EC}$, and EF . (10 points)

Calculations and/or Diagrams:
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## Calculations and/or Diagrams (cont'd):

2. Draw the influence lines of: Reactions at A , and member forces EB and EC , for a load moving vertically downward along ABCD. (10 points)
From influence lines, compute the reactions and forces above for the loads shown in Figure I and compare with question 1. (5 points)
If a uniform vertical load (down) of 3 tons $/ \mathrm{m}$ is applied on AB and BC , calculate from influence line the force in member EC. Deduce an equivalent system of concentrated loads placed at nodes A, B, C, which will replace the uniform load on AB and BC (your system should lead to the same results for member force EC and this should be verified). (5 points)

## Calculations and Diagrams:

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## Calculations and Diagrams (cont'd):

## Problem II:(70 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.

1. Let $\boldsymbol{w}=\mathbf{2 0} \mathbf{k N} / \mathbf{m}$ and $\mathbf{P}=\mathbf{2 0} \mathbf{k N}$

Compute the reactions in the beam, and draw the shear and bending moment diagrams; $\square$ sketch the deflected shape. (20 points)

SHEAR:


MOMENT:


DEFLECTION:


## Calculations and/or Diagrams (cont'd):

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2. Referring to Figure II, draw the influence lines for $\boldsymbol{R}_{\boldsymbol{A}}, \boldsymbol{R}_{\boldsymbol{E}}, \boldsymbol{M}_{\boldsymbol{B}}, \boldsymbol{M}_{\boldsymbol{D}}, \boldsymbol{V}_{\boldsymbol{C}}$, and $\boldsymbol{V}_{\boldsymbol{D}}$. Draw in the order which you find appropriate. ( 25 points)

Calculations and Diagrams:

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## Calculations and Diagrams (cont'd):

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3. Let $\boldsymbol{w}_{\boldsymbol{D}}=\mathbf{1 0} \mathbf{k N} / \mathbf{m}$ (dead load); $\boldsymbol{w}_{\boldsymbol{L}}=\mathbf{2 0} \mathbf{k N} / \mathbf{m}$ and $\boldsymbol{P}=\mathbf{2 0} \mathbf{k N}$ (live loads)

- Compute the maximum absolute value for $\boldsymbol{R}_{\boldsymbol{A}}$, and show the corresponding loading position. (9 points)
- Compute $\boldsymbol{R}_{\boldsymbol{A}}$ for $\boldsymbol{w}_{L}$ on AC only and $\boldsymbol{P}$ on D and compare with question 1 (do not include $\boldsymbol{w}_{\boldsymbol{D}}$ ). (6 points)

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## Calculations and Diagrams (cont'd):

4. Compute the maximum absolute value of $\boldsymbol{M}_{\boldsymbol{B}}$ 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)


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## EXTRA SHEET 1: Continued from page

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Calculations and/or Diagrams:

## EXTRA SHEET 2: Continued from page

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Calculations and/or Diagrams:

