## DEFLECTION OF BEAMS (3/4)

CIVE311 - STRUCTURES I
(Wednesday, April 16, 2008)
PROBLEM TAKEN AS IS FROM QUIZ 2 (SPRING 2001-02)

Problem I: (60 points)


## Figure I

Referring to Figure I, let $\boldsymbol{E I}=\mathbf{5 0 , 0 0 0} \mathbf{k N} . \mathbf{m}^{2}$ throughout the beam. Neglect the own weight of the beam.

## USE THE MOMENT-AREA METHOD THROUGHOUT THIS PROBLEM.

1. Let $\boldsymbol{w}=\mathbf{1 0} \mathbf{k N} / \mathbf{m}, \boldsymbol{P}_{1}=\mathbf{5 0} \mathbf{~ k N}$, and $\boldsymbol{P}_{2}=\mathbf{1 0} \mathbf{~ k N}$

Compute the slope at $\mathrm{C}\left(\vartheta_{C}\right)$, the deflections at B and D ( $\boldsymbol{v}_{\boldsymbol{B}}$ and $\boldsymbol{v}_{\boldsymbol{D}}$ ), and the maximum downward deflection between A and $\mathrm{C}\left(\boldsymbol{v}_{\max }\right)$. ( 45 points)
NOTE: You can calculate slopes and deflection in whichever order you find suitable.
Calculations and Diagrams:
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## Calculations and/or Diagrams (cont'd):

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Calculations and/or Diagrams (cont'd):

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Calculations and/or Diagrams (cont'd):

2. Compare $\boldsymbol{v}_{\boldsymbol{B}}$ and $\boldsymbol{v}_{\max }$ from Part 1 and briefly comment. (5 points)

Compare $\boldsymbol{v}_{\boldsymbol{B}}$ and $\boldsymbol{v}_{\max }$ from Part 1 to the mid-span deflection ( $\boldsymbol{v}_{\boldsymbol{B}}$ ) of the beam (same $\boldsymbol{E I}=\mathbf{5 0 , 0 0 0} \mathbf{k N} . \mathbf{m}^{2}$ ) shown below and briefly comment. (10 points) NOTES:

- In answering the questions above, you should use the values calculated as well as your engineering judgment; i.e. if it happens that the values obtained are not logical or do not make sense when compared with each other, this may be a hint that you may have done something wrong somewhere (?). If you do not have time to review and correct, make the proper judgment, answer accordingly, and note this in your comment.
- In calculating $v_{B}$ below, you should take advantage of symmetry and of the fact that the slope is zero at B . This will simplify your calculation of $\boldsymbol{v}_{\boldsymbol{B}}$ to a single line only (or, if you know the formula, you may use is directly).


Calculations and Diagrams:
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Calculations and/or Diagrams (cont'd):
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Write/Draw a joke, a caricature, an opinion, a say, whatever you like. Anything NOT related to STRUCTURES I!

