Seat No

King Mongkut's University of Technology Thonburi

Final Examination
Semester 1 Academic Year 2014

CVE 338: Structural Analysis II

Date : 28th November 2014 Time 9:00 –12:00

Instructions :

1. The exam has **4** questions in **12** pages. Total points are **40** points with each question not of equal points.
2. Read the questions carefully and strictly follow instruction.
3. Textbooks and written materials **are not allowed** in the examination room.
4. A calculator is allowed.
5. Write your name on every page.
6. Perform your work in the examination paper.

Examiner: Assistant Professor Dr. Aphinat Ashakul
Tel. 02-470-9148

This examination paper has been approved by the Department of Civil Engineering

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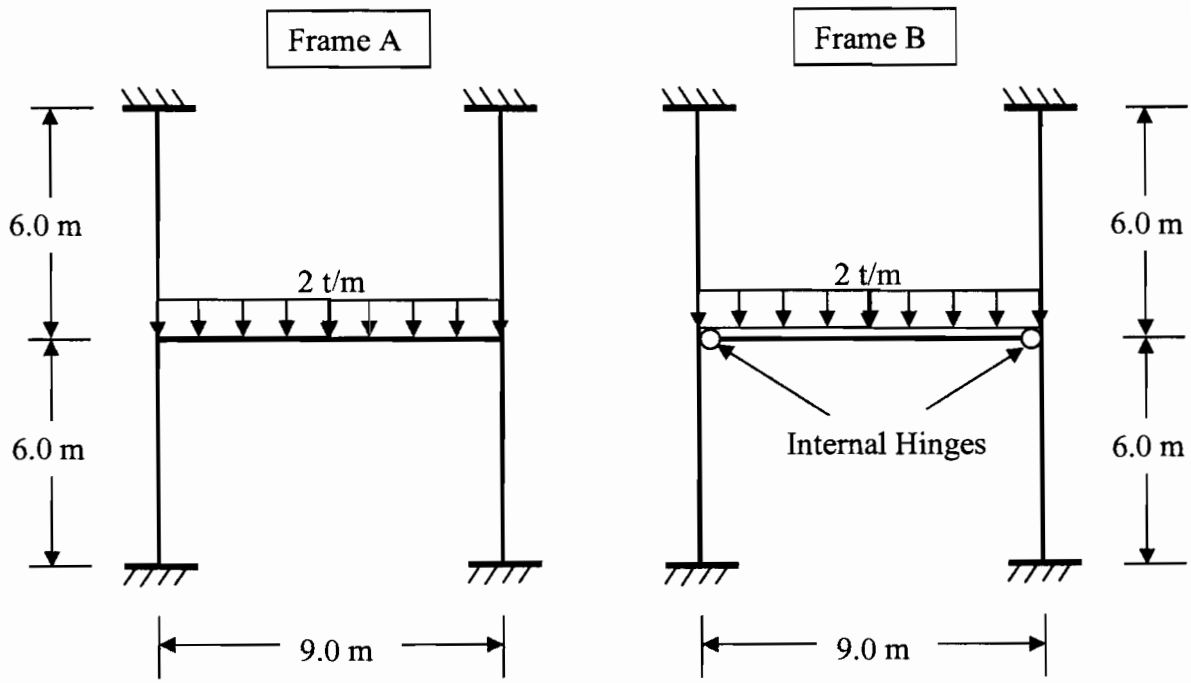
Associate Professor Dr. Sutat Leelataviwat
Head of the Civil Engineering Department

Student Name & I.D._____

Student Name & I.D._____

1. From the two frames with constant EI shown (**Total 10 Points**):
a) Draw bending moment diagram of Frame A by using the moment distribution method
b) Draw bending moment diagram of Frame B by using any method of your choice and discuss the difference between bending moment of the two structures.
d) If both structures have a lateral load, explain the difference between the behavior of the two frames (Draw bending moment diagrams if you think it helps)



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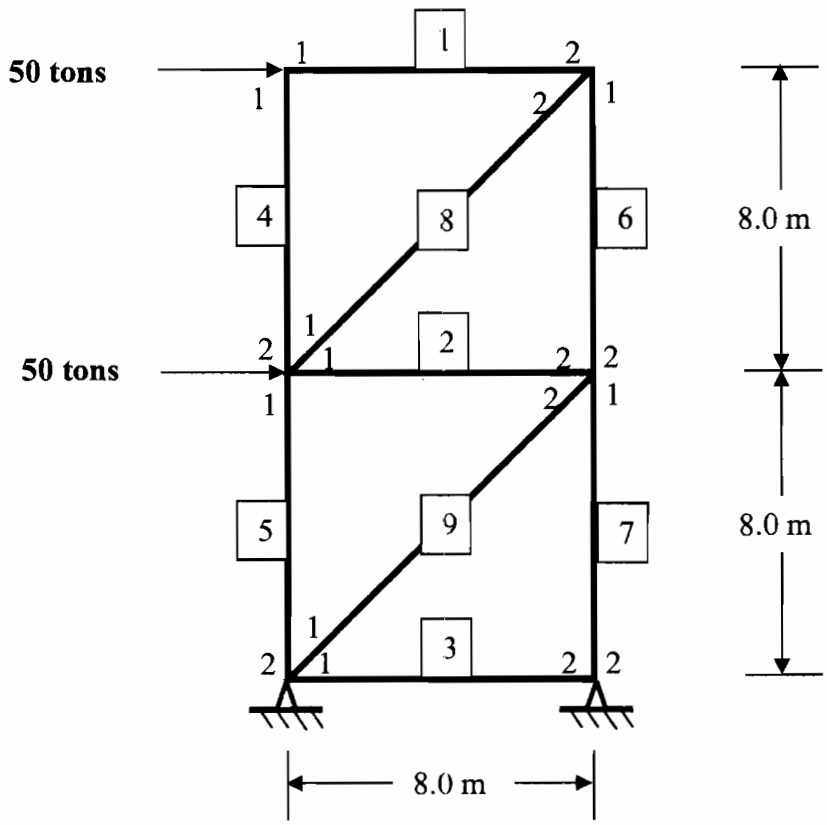
2. Assemble the global stiffness and force matrices of the truss system shown. EA is constant. Use the member numbers and local node system as noted, a failure to comply with these numbers might result in half of total points punishment. **(14 Points)**



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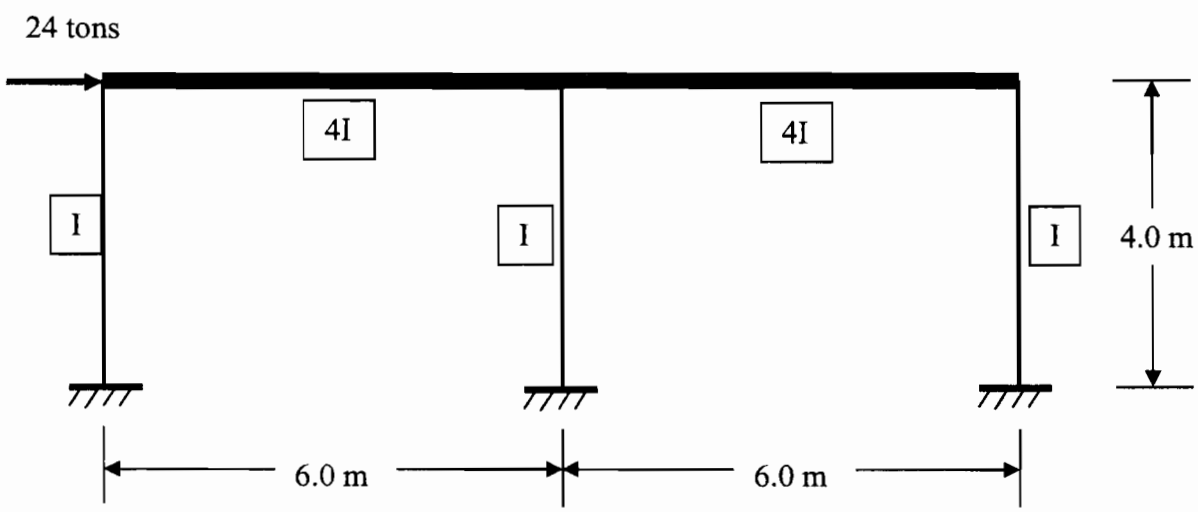
3. Draw bending moment of the frame shown by using the moment distribution method. A good suggestion for fixed end moment due to sidesway is 20 t.m. **(10 Points)**



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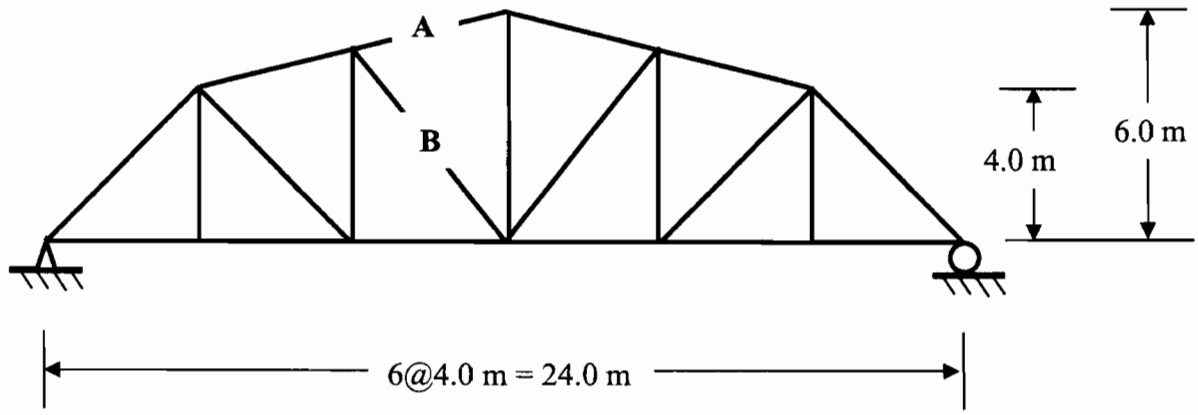
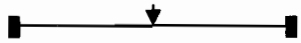
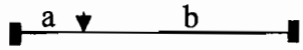
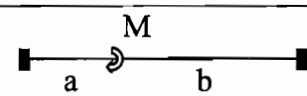
4. Draw the shape of IL of the forces in the truss members **A** and **B**. Also, develop equations you need to calculate values in those lines. (**6 Points**)



Student Name & I.D._____

Selected Fixed End Moments

Load Characteristics	FEM_{AB}	FEM_{BA}
	$-\frac{PL}{8}$	$\frac{PL}{8}$
	$-\frac{Pab^2}{L^2}$	$\frac{Pa^2b}{L^2}$
 W= wL	$-\frac{wL^2}{12} = -\frac{WL}{12}$	$\frac{wL^2}{12} = \frac{WL}{12}$
 W= wc	$-\frac{Wa}{12L^2}[12a^2b + c^2(L - 3b)]$	$\frac{Wa}{12L^2}[12ab^2 + c^2(L - 3a)]$
	$-\frac{Wa}{12L^2}(6L^2 - 8aL + 3a^2)$	$\frac{Wa^2}{12L^2}(4L - 3a)$
If a = L/2 in the case above	$-\frac{11wL^2}{192}$	$\frac{5wL^2}{192}$
	$\frac{Mb}{L^2}(3a - L)$	$\frac{Ma}{L^2}(3b - L)$
	$\frac{6EI\Delta}{L^2}$	$\frac{6EI\Delta}{L^2}$

Slope-Deflection Equations

$$M_{ij} = 2E(K)_{relative}(2\theta_i + \theta_j - 3\psi_{ij}) + FEM_{ij}$$

Modification for Simple End Support (When i is the simple end)

$$M_{ji} = 3E(K)_{relative}(\theta_j - \psi_{ij}) + FEM_{ji} - FEM_{ij}/2$$

Element Global Stiffness Matrix

$$[K^i] = \frac{EA_i}{L_i}\begin{bmatrix} c^2 & cs & -c^2 & -cs \\ cs & s^2 & -cs & -s^2 \\ -c^2 & -cs & c^2 & cs \\ -cs & -s^2 & cs & s^2 \end{bmatrix}$$