King Mongkut's University of Technology Thonburi

Midterm Examination
Semester 1 Academic Year 2014

CVE 338: Structural Analysis II

Date : 24th September 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

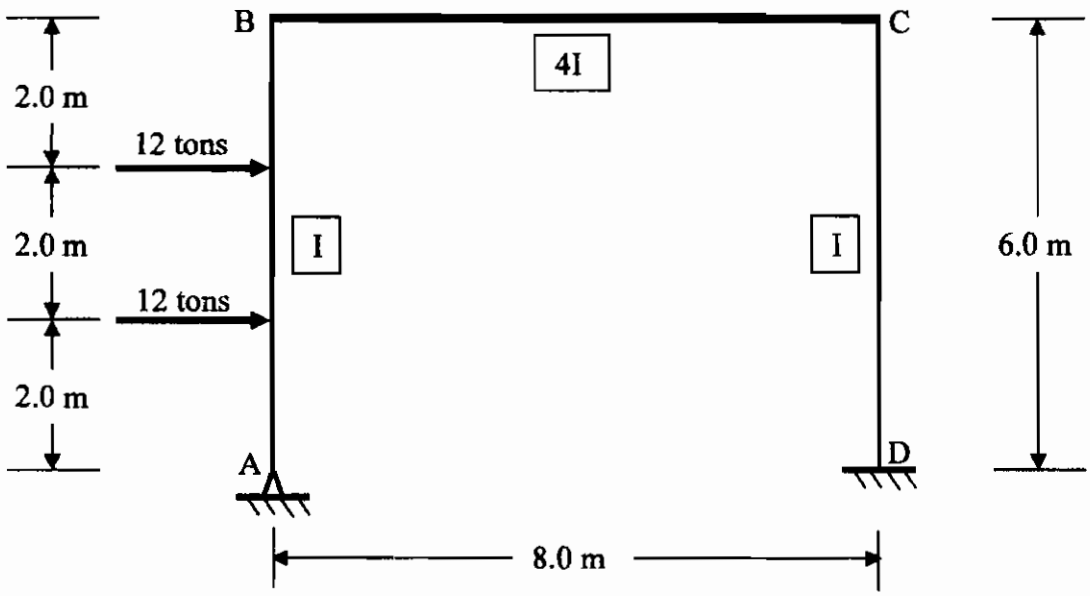
This examination paper has been approved by the Department of Civil Engineering

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

Student Name & I.D._____

Student Name & I.D._____

1. Calculate all the reactions of the frame shown by using the slope-deflection method, and then complete the free body diagram of all the members (member AB, BC, and CD). **(15 Points)**



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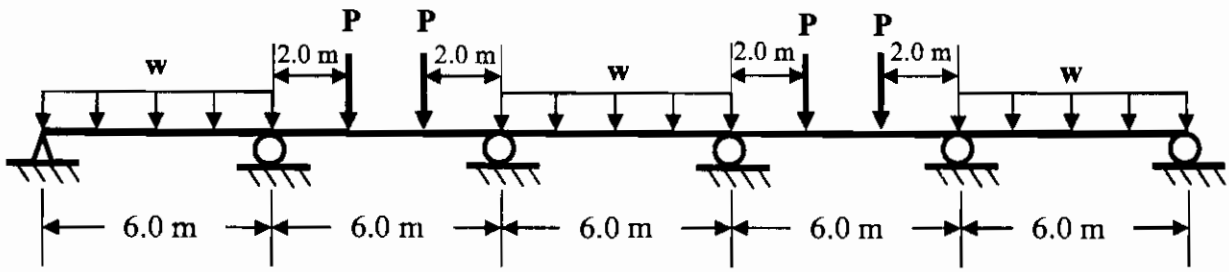
2. Calculate rections of the beam shown by using the slope deflection method. EI is constant. Point load **P** is equal to 15 tons, whereas uniform load **w** is equal to 2.4 t/m. **(10 Points)**



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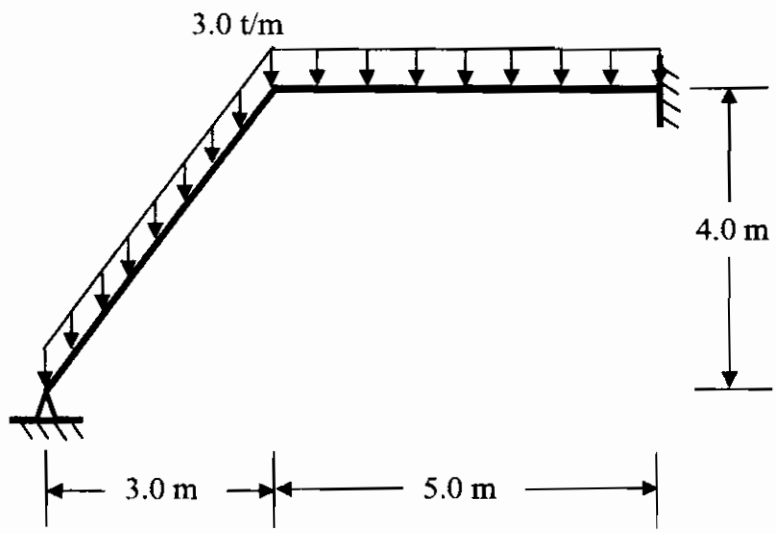
3. Write integrals necessary to perform the Castigliano's method (method of least work) for the frame shown. **DO NOT** perform integration. EI is constant. **(6 Points)**



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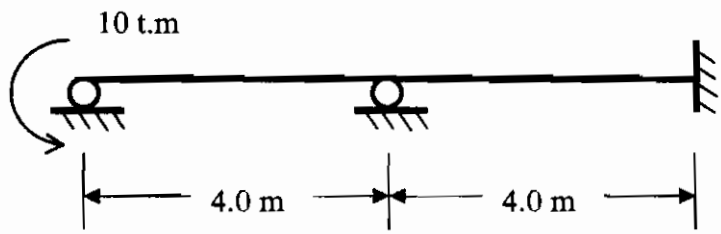
4. Calculate reactions for the beam shown by using any of the Force Method. EI is constant. **(9 Points)**



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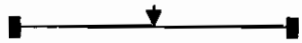
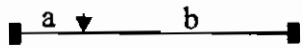
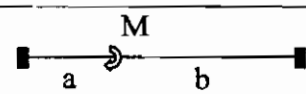
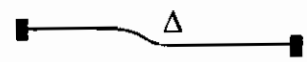
Selected Fixed End Moments

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)

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