PHINMA - ARAULLO UNIVERSITY
COLLEGE OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT
SY 2025-2026

STRUCTURAL THEORY
CIE 136

LABORATORY NO. 3
VIRTUAL WORK METHOD ON TRUSSES

SUBMITTED BY

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SUBMITTED TO

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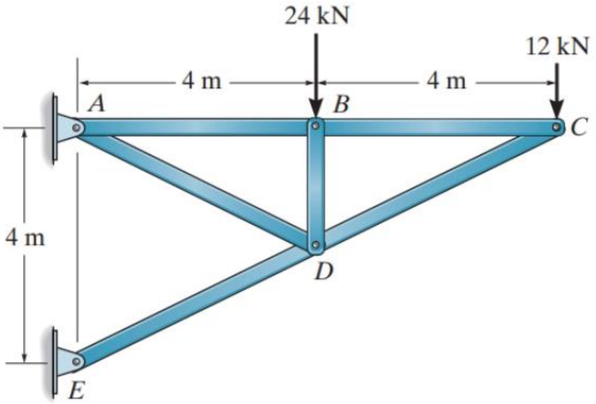
Laboratory Problem Set Rubric

Criteria	Description	Points
1. Accuracy of Solutions	All calculations, answers, and problem-solving steps are correct. Proper formulas and logic are applied.	25
2. Conceptual Understanding	Shows clear understanding of the principles; correctly applies them to explain answers.	20
3. Drawing / Diagram Quality	Diagrams are accurate, clearly labelled, neat, and appropriate for the task.	15
4. Neatness & Organization	Work is legible, well-structured, and cleanly presented. **Minimal to no erasures**; corrections are neat.	15
5. Completeness	All required questions, calculations, and drawings are fully and properly answered. No missing parts.	10
6. Use of Units & Labels	Correct and consistent use of units, labels, and symbols (including in diagrams and calculations).	10
7. Timeliness of Submission	Problem set was submitted **on or before the deadline**.	5

1. Assume the members are pin connected at their end points. Take A = 200 mm^2 and E = 200 GPa for each member.
   a. Determine the vertical displacement of joint C
   b. If no loads applied determine the vertical displacement of joint C if members AB and BC experience a temperature increase of $\Delta T = 50^\circ\text{C}$. Take $\alpha = 12\times10^{-6}/^\circ\text{C}$.
   c. If no loads applied determine the vertical displacement of joint C if member CD is fabricated 10 mm too long.



2. Assume the members are pin connected at their end points. Take A = 400 mm^2 and E = 200 GPa for each member.
   a. Determine the vertical displacement of joint B.
   b. Determine the vertical displacement of joint B if members EF and DE experience a temperature increase of $\Delta T = 45^\circ C$. Take $\alpha = 12\times10^{-6}/^\circ C$.
   c. Determine the vertical displacement of joint B if member AF is fabricated 10 mm too long.