ARCH 614: Example Note Page for Quiz Use

ENDS 231: Practice Quiz 2

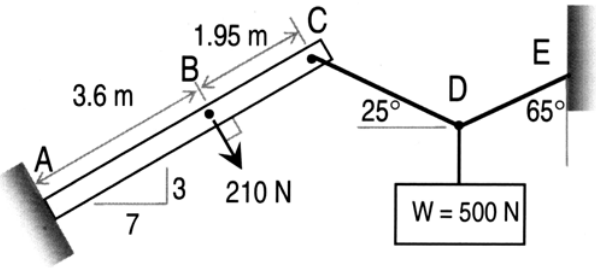
*Note: No aids are allowed for part 1. The text (reference charts) and one side of a letter sized paper with notes are allowed during part 2, along with a silent, **non-programmable** calculator.*

Clearly show your work and answer.

Part 1) *Worth 5 points* *(conceptual questions)*

Part 2) *Worth 45 points*

The structure shown is supporting a cable system with a force due to a mass. *(NOTE: The support configuration for the non-cables in the system and the slopes of the cables can be changed for the quiz!)*



Using clear free body diagrams, determine:

a) the forces in cables CD and DE.

b) the support reactions (with direction).

→ equilibrum of a point = Free the point with cables, weight or struts or truss members. Draw forces away if unknown. Get angle or geometry of forces. $\Sigma F_x = 0$ $\Sigma F_y = 0$. Algebra → divide both sides by same # to cancel move to other side by changing sign

equilibrum of a rigid body

$\sin\theta = \frac{O}{H}$ $\cos\theta = \frac{A}{H}$

$H = \sqrt{A^2 + O^2}$

$F_x = F \cdot \sin\theta$ $F_y = F \cdot \cos\theta$

CD, DE, 155, 250, 25°, 500 N

DE = 90 − 65

$\Sigma F_x = CD \cdot \cos 155 + DE \cdot \cos 25 = 0$ DE = CD! DE = CD = 591.6 N

$\Sigma F_y = CD \sin 155 + (CD) \cdot \sin 25 - 500 = 0$ $0.845\,CD = 500$ N

$\sqrt{3^2 + 7^2} = 7.62$

5.55, 3.6m, 7.62, 3, 7, 210, 25, 25, 591.6 N, a = 5.10, b = 2.18

$a = \frac{7}{7.62} \cdot 5.55 = 5.10$

$b = \frac{3}{7.62} \cdot 5.55 = 2.18$

draw the body freed — put all loads on. Look up supports. IF F_x & F_y can put them in my coordinate system. Fixed connections have a REACTION MOMENT Use ΣM at TWO unknowns intersection ΣF_x ΣF_y and ΣM Look for perpendicular distances to forces. IF NOT use the component for 2 moments.

Careful with geometry

$\Sigma F_x = A_x + 210 \cdot \frac{3}{7.62} + 591.6 \cdot \cos(-25) \cdot 5.10 = 0$

$A_x = -618.8$ N

$\Sigma M_A = M_{RA} - 210 \cdot 3.6 - 591.6 \cdot \sin(-25) \cdot 5.10 - 591.6 \cdot \cos(-25) \cdot 2.18 = 0$

$M_{RA} = 3200.0$ N-m

Similar triangles $\frac{A}{a} = \frac{B}{b} = \frac{C}{c}$

$A_y = 442.9$ N

$\Sigma F_y: A_y - 210 \cdot \frac{7}{7.62} + 591.6 \cdot \sin(-25) = 0$

Answers – Not provided on actual quiz!

a) CD = 591.6 N, DE = 591.6N

b) A_x = -618.9 N A_y = 443.0 N, M_{RA} = +3203.4 N-m

Disclaimer: Answers have NOT been painstakingly researched.