



# UNIVERSITY OF SANTO TOMAS

COLLEGE OF ENGINEERING AND ARCHITECTURE

CE 311 - CIVIL ENGINEERING  
STRUCTURAL ANALYSIS

PROBLEM 1: A beam of length 10m is supported by a pin support at the left end and a roller support at the right end. A uniformly distributed load of 2kN/m is applied over the entire length of the beam. Determine the reaction forces at the supports.

SOLUTION: The reaction forces at the supports are determined by the equilibrium equations. The sum of the forces in the vertical direction must be zero, and the sum of the moments about any point must also be zero.

Let  $R_1$  be the reaction force at the pin support and  $R_2$  be the reaction force at the roller support. The weight of the beam is  $W = 2 \text{ kN/m} \times 10 \text{ m} = 20 \text{ kN}$ .

Sum of forces in the vertical direction:  $R_1 + R_2 - W = 0$

Sum of moments about the pin support:  $R_2 \times 10 - W \times 5 = 0$

$$R_2 = 2 \text{ kN}$$

Substituting  $R_2 = 2 \text{ kN}$  into the first equation, we get  $R_1 + 2 - 20 = 0$ , so  $R_1 = 18 \text{ kN}$ .

Therefore, the reaction forces are  $R_1 = 18 \text{ kN}$  at the pin support and  $R_2 = 2 \text{ kN}$  at the roller support.

Final examination for the first semester of the year 2020-2021.

October 2021

Through my...

Steadily,

*Alvin*

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August 13 - Start of Regular Classes

20 21 22 23 24 25 26 27 28 29 30 31

Day	Activity
Monday	Orientation
Tuesday	Orientation
Wednesday	Orientation
Thursday	Orientation
Friday	Orientation
Saturday	Orientation
Sunday	Orientation

Day	Activity
Monday	Orientation
Tuesday	Orientation
Wednesday	Orientation
Thursday	Orientation
Friday	Orientation
Saturday	Orientation
Sunday	Orientation

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September 26 - 27

Day	Activity
Monday	Orientation
Tuesday	Orientation
Wednesday	Orientation
Thursday	Orientation
Friday	Orientation
Saturday	Orientation
Sunday	Orientation