The University of Jordan
School of Engineering

Course Name	Course Number	Semester
Machine Design I	0904435	Spring 2022/2023

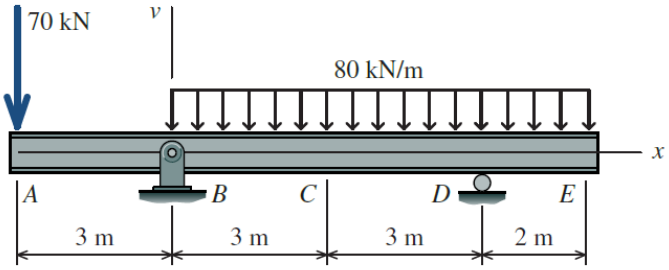
Deflection using the Superposition Method

Name: URN:

For the following problems, show how the superposition method can be used to solve each.

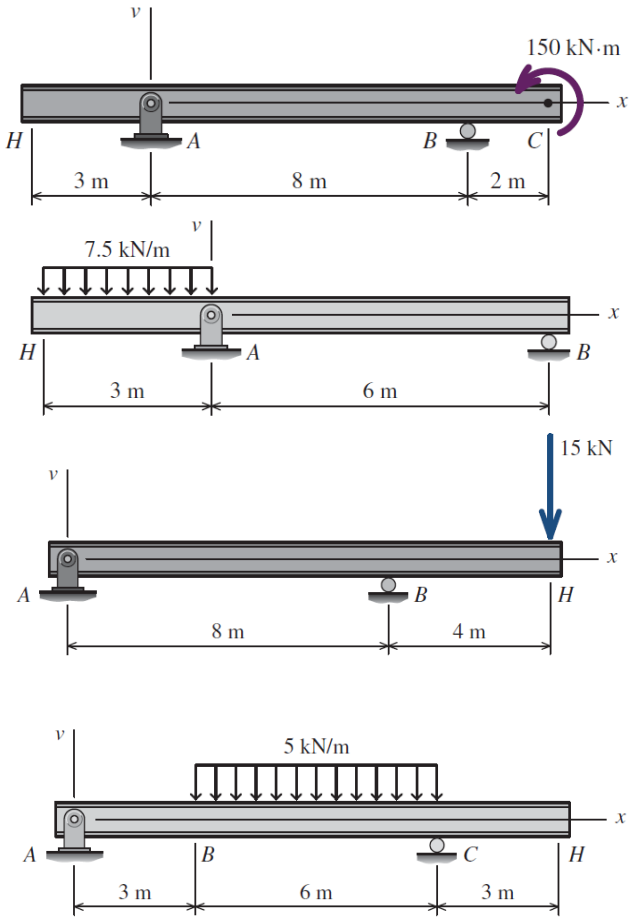
Problem01

The simply supported beam shown consists of a W410 × 60 structural steel wide-flange shape [E = 200 GPa; I = 216 × 106 mm^4].
For the loading shown, determine
(a) the beam deflection at point A.
(b) the beam deflection at point C.
(c) the beam deflection at point E.



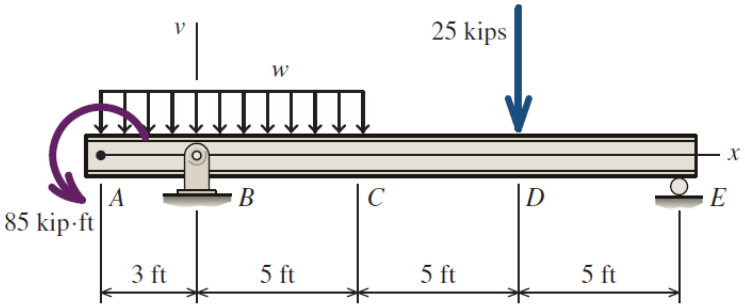
Problem02

For the beams and loadings shown in the Figures below, determine the beam deflection at point H. Assume that EI = 8 × 10^4 kN · m^2 is constant for each beam.



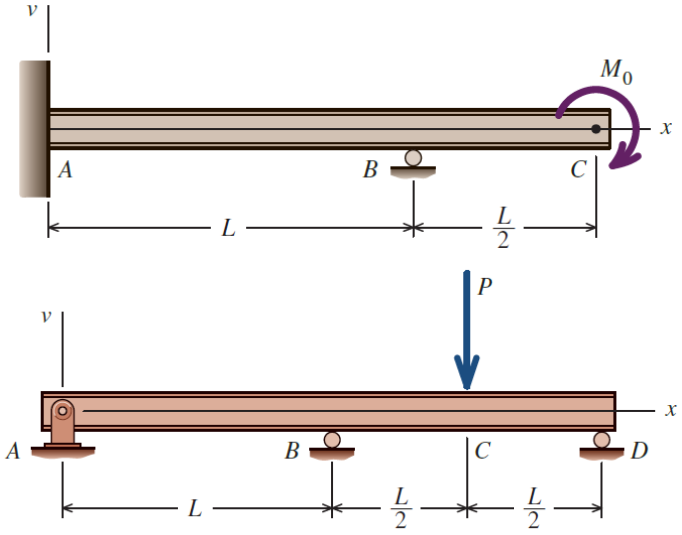
Problem03

The simply supported beam shown consists of a W10 × 30 structural steel wide-flange shape [E = 29,000 ksi; I = 170 in.^{4}]. If w = 5 kips/ft, determine
(a) the beam deflection at point A.
(b) the beam deflection at point C.



Problem04

For the beams and loadings shown, derive an expression for the reaction at support B. Assume that EI is constant for the beam.



Problem05

A 24 ft long W12 × 30 steel beam is supported at its ends by simple pin and roller supports and at mid-span by a wooden beam, as shown. Steel [E = 29 × 10^6 psi] beam (1) supports a uniformly distributed load of 1,500 lb/ft. Wooden [E = 1.8 × 10^6 psi] beam (2) spans 10 ft between simple supports C and E. The steel beam rests on top of the wooden beam at the middle of the 10 ft span. The wooden beam has a cross section that is 6 in. wide and 10 in. deep. Determine
(a) the reaction force at point B applied by the wooden beam to the steel beam.
(b) the deflection of point D.