Final Examination: Semester II

Academic Year 20)7

Wednesday, February 20, 2008

Time 13:30-16:30

220-506 Stability of Structures

Room: R201

Instructions.

1. There are 3 questions with equal marks.

2. Attempt all questions.

3. Books and notes are allowed.

4. Pencils are recommended to be used in answering the questions.

Instructor : Fukit Nilrat

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1. Find the critical load P_{cr} of the frame shown using the matrix stiffness method by assuming that all mer ibers are inextensible. Note that the flexural stiffness of the beam BC is three times of the column AB.
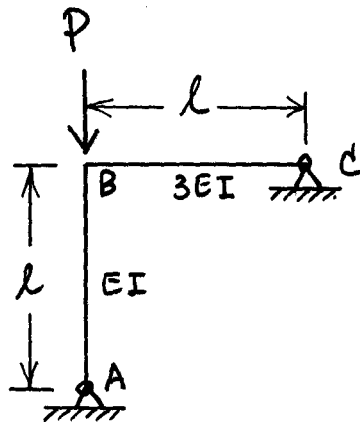
2. A simply supported steel 250x125 mm H-beam is subjected to uniformly distributed load w at the top fla ige of the beam as shown. The beam span is 4.5 m and there is no lateral bracing between the two supports.

   Determine the critical point load w_{cr} in kg/m corresponding to the elastic lateral torsional buckling of the)eam. Neglect the weight of the beam.

cross section
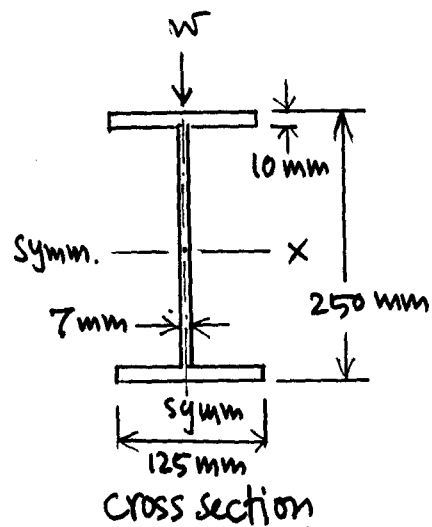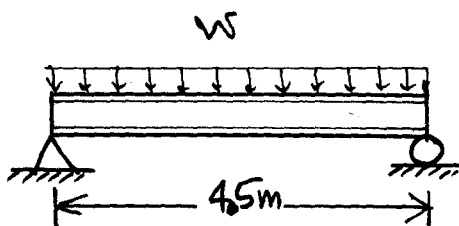
3. A hinged-hinged column is subjected to an axial load P as shown. Using the Rayleigh-Ritz method t y assuming that the lateral displacement v in the y-direction for the buckling shape of the column is $v = a$ $\sin(\pi x/l)$, determine the approximate elastic buckling load P_{cr} by the Rayleigh-Ritz method and comj are the obtained critical load to the Euler buckling load. Comment on the comparison.