

MINOR I :CVL756 ADVANCED STRUCTURAL ANALYSIS (2022-23)

Venue: LH 517

Date: 26 Sep 2022

Max marks : 30

NOTE: (a) All questions are compulsory. (b) Draw neat and clear sketches wherever required.
(c) Assume suitable data if necessary. (d) Assume members as extensible unless otherwise stated.
(e) All answers must be supported by calculations/ justification to secure assigned marks.

Q1.

Determine F_{63} for the beam shown in Figure 1. EI linearly increases from EI to $2EI$ for the right half of the beam length as shown in the figure.



Figure 1

(10 marks)

Q2.

Figure 2 shows a 2D frame under vertical loading. Carry out following steps for this structure keeping in mind the final end goal- obtaining all joint rotations. (EI is same for all members $\alpha=1$ for all members):

- Starting from the top left, number all joints and the mark the corresponding degrees of freedom, including those corresponding to support reactions. Members may be numbered from left to right, first numbering beams and then columns
- Compute the sizes of K_{pp} and K_{xx} and half-band width.
- Form association matrices for the two beam elements.
- Form the force and the reaction vector.
- Express K_{TS} (3,6) in terms of the member stiffness matrices of contributing members in global coordinate system.

(2x5=10 marks)

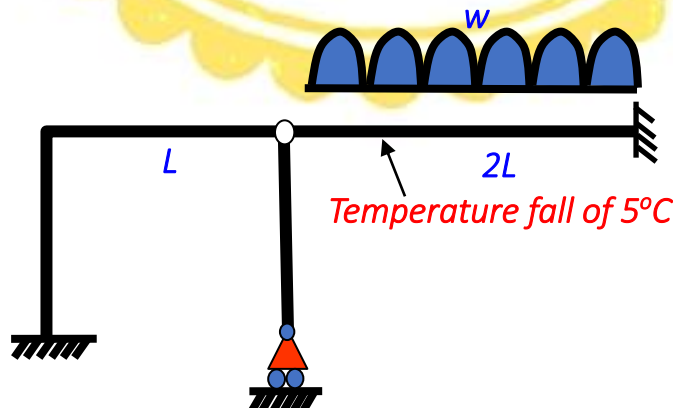


Figure 2

Q3.

For the case of 3D analysis of structural system considering rigid floor slabs, will there be a possibility of axial force and torsion in beam elements? Explain your answer with justification.

(5 marks)

Q4.

There is a 10 storey regular orthogonal building with rigid slab and 10x10 nodes on all floors. Determine the half band width of K_{JJ} matrix

(5 marks)

