

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

MINOR I :CVL756 ADVANCED STRUCTURAL ANALYSIS (2021-22)

Venue: Online

Date: 22 Sep 2021

Max marks : 20

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_{33} for the beam shown in Figure 1. Assume that the cross section is rectangular and that $EI = 5 \times 10^4 \text{ kNm}^2$, $GA = 3 \times 10^3 \text{ kN}$.



Figure 1

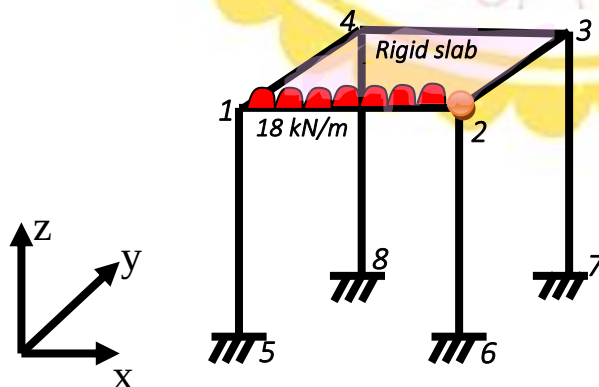
(10 marks)

Q2.

The structure shown in Figure 2 is a 3D portal frame with a rigid floor slab and hinge at joint 2. It has a UDL on a beam member as shown. The weight of the floor slab can be ignored. All members have length equal to 5 m. For this structure:

- Compute the sizes of K_{pp} and K_{xx}
- Show all degree of freedom at joint 2
- Form non-zero elements of the force vector
- Determine the half band width of K_{pp}

(2+2+4+2=10 marks)



Global coordinate system

Figure 2