

# DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

## MINOR I :CVL756 ADVANCED STRUCTURAL ANALYSIS (2020-21)

Time allowed: 40 mins

Date: 08 Nov 2020

Venue: Online

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 the element  $K_{22}$  of the stiffness matrix of the non-prismatic member shown in Figure 1 keeping in consideration the special condition that the left end of the member is permanently hinged. The moment of inertia of the member linearly increases to  $I_0$  from the left end to the right.



Figure 1

(7 marks)

Q2.

Form the R matrix for columns "1" and "2" shown in Figure 2, where both plan and 3D views are shown for clarity. All beams and columns have length equal to "L"

(5+8=13 marks)

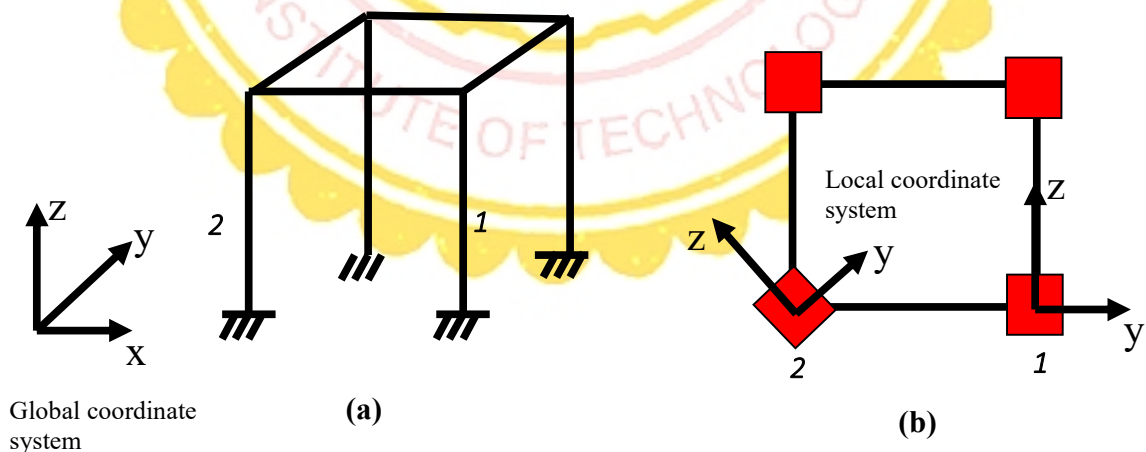


Figure 2 (a) 3D view (b) Plan view