DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

MINOR I :CVL756
ADVANCED STRUCTURAL ANALYSIS (2017-18)

Time allowed: 1hour **Date:** 30 August 2017
Venue: LH 422 **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. Conceptually explain how you would incorporate the presence of the internal release in the formation of stiffness matrix of the structure shown in Fig. 1. **(5 marks)**

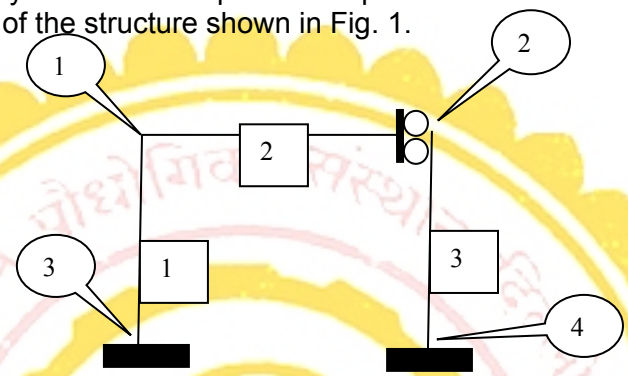

Fig. 1

Q2. Derive K_{33} for a prismatic beam element in terms of its elastic and geometrical constants taking into consideration the effect of shear deformation. Form factor of the section is 0.5. **(6 marks)**

Q3. The structure shown in Fig. 2 is to be analyzed using direct stiffness approach with the aid of a **computer program**. The user has numbered the members and joints as shown in the figure. For this structure:

(a) Determine the sizes of K_{pp}, K_{px} and K_{xx}.
(b) Determine half band width of K_{pp}.
(c) Is there a possibility of further reducing the band width? If yes, how?. Show it by means of figure.

(2+2+2= 6 marks)

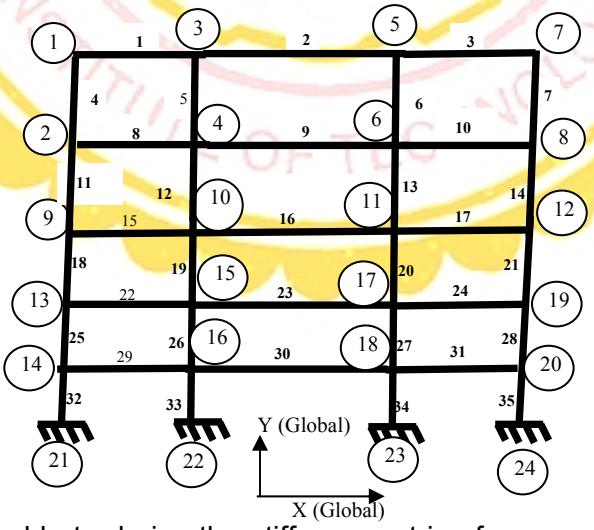

Fig. 2

Q4. Why it is not practicable to derive the stiffness matrix of a non-prismatic member using the definition of stiffness element. How is the problem solved? **(3 marks)**