

MINOR I :CEL756/ 717
ADVANCED STRUCTURAL ANALYSIS (2015-16)

Time allowed: 1hour
Venue: V 216

Date: 29 August 2015
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. For the structure shown in Fig. 1, explain how you will apply the method of substructures for analyzing it. Clearly state what is the quantitative advantage in terms of reduced matrix sizes and bandwidth as compared to the situation when normal method without substructuring is employed **(6 marks)**

Q2. Let the 3D structure shown in Fig. 2 be analyzed using direct stiffness approach, taking into consideration the effect of the floor slabs shown. For this structure,

- (a) Label and show all degrees of freedom.
- (b) What shall be the sizes of K_{JJ} , K_{FF} and K_{XX} .
- (c) Explain the steps involved in static condensation.
- (d) What are the specific advantages of condensation.

(2x4 = 8 marks)

Q2. Formulate the process of analysis of the structure shown in Fig. 3 by means of direct stiffness approach (up to the formation of K_{TS}) duly taking into consideration the presence of the hinge. Form all elements of the force vector. State how the member force/ displacement output needs to be corrected to take care of the fixed ended forces/ displacement effects.

(6 marks)

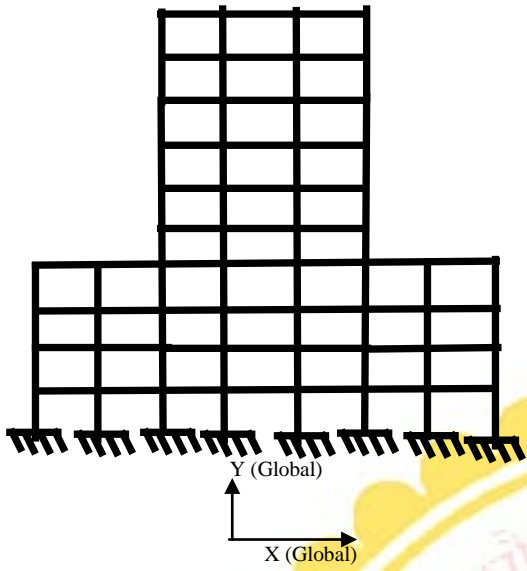


Fig. 1

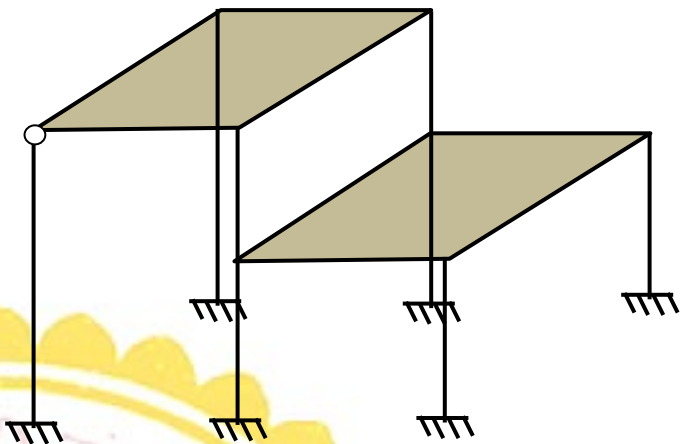


Fig. 2

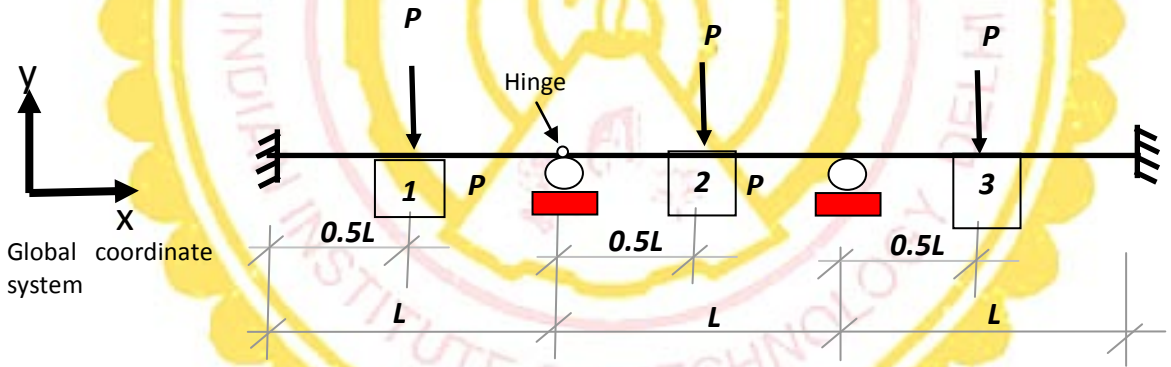


FIG. 3