

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

MAJOR :CEL717/ CVL 756 ADVANCED STRUCTURAL ANALYSIS (2015-16)

Time allowed: 2 hours

Date: 18 Nov 2015

Venue: IV LT 3

Max marks : 40

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. Draw all basic and independent failure mechanisms a three-bay single storey portal frame. Obtain any three feasible mechanisms by combining the basic mechanisms. All hinge cancellations should be clearly shown.

(4+3 = 7 marks)

Q2. Compute the critical failure load of the frame shown in Fig.1 using the plastic analysis approach for: (a) pure sway mechanism; and (b) combined mechanism in which there is no hinge formation at point A. Carry out the yield check on both the mechanisms.

(10 marks)

Q3. Explain how 2D frame analysis is justified for a symmetrical 3D frame under symmetrical horizontal loads and having a rigid floor slab at each floor level. Can this analysis be reduced to the analysis of a maximum of two frames even if the frames are not identical along each principal axis? Explain how.

(6 marks)

Q4. Use matrix force method to determine the **vertical deflection under point C** (mid point of BD) of the frame shown in Fig. 2.

(6 marks)

Q5. Determine the shape factor of box section with mean dimension L and thickness t which is sufficiently smaller than L .

(6 marks)

Q5. Derive moment curvature relationship for a rectangular section for the non-linear region subsequent to the yield point.

(5 marks)

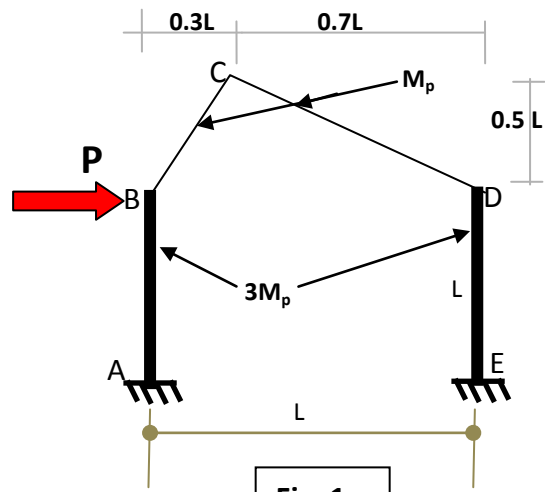


Fig. 1

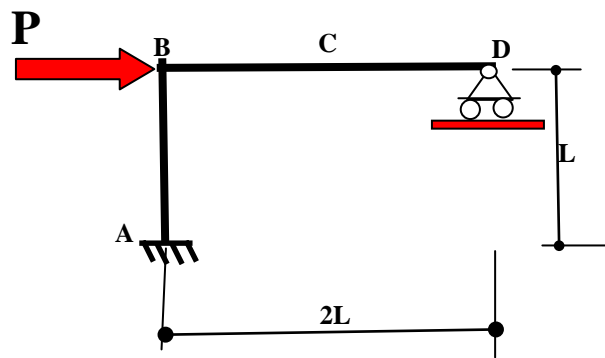


Fig. 2