

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

MAJOR : CVL 756 ADVANCED STRUCTURAL ANALYSIS (2022-23)

Time allowed: 2 hours (11 am-1pm)

Date: 18 Nov 2022

Venue: LH 517

Max marks : 50

NOTE: (a) All questions are compulsory. (b) Draw neat and clear sketches wherever required.
(c) Assume suitable data if necessary. (d) Assume members as INEXTENSIBLE unless otherwise stated. (e) All answers must be supported by calculations/ justification to secure assigned marks. (f) This question paper has two printed pages
(g) BEGIN ANSWER TO A QUESTION ON A FRESH PAGE

- Q1.** Determine the shape factor of the section shown in Fig. 1.
(7 marks)
- Q2.** Use matrix flexibility method to obtain deflection of the structure shown in Fig. 2 at point C.
(10 marks)
- Q3.** Derive expression for maximum slope of a plate from first principles. State all assumptions clearly.
(5 marks)
- Q4.** The inclined portal frame shown in Fig. 3 has a plastic moment capacity of 500 kNm for beams and 300 kNm for columns. For this structure:
- (a) Draw all possible failure mechanisms
 - (b) Determine the failure load for the beam column mechanism involving the participation of the right column (left column remaining standing on its own).
 - (c) Check the satisfaction of the yield criteria at point D for the above mechanism
- (3+10+5 = 18 marks)
- Q5.** Determine the form factor (shear correction factor) of the section shown in Fig. 4.
(5 marks)
- Q6.** For what type of structures is the method of substructures most relevant and useful.
(3 marks)
- Q7.** How can the effect of rigid diaphragm action modelled using link elements.
(2 marks)

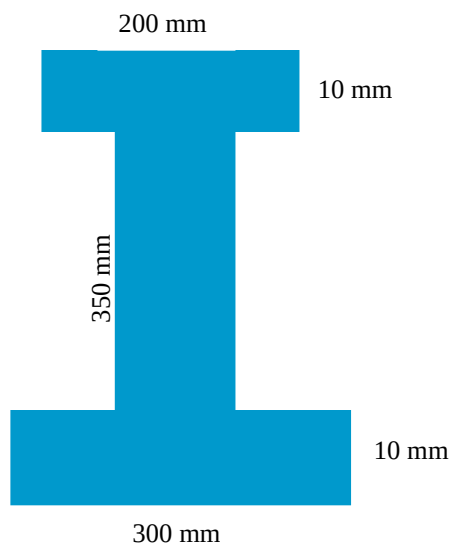


Fig. 1



Fig. 2

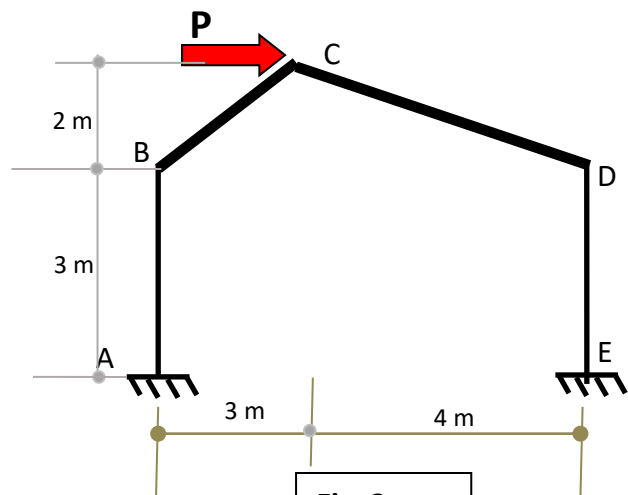


Fig. 3

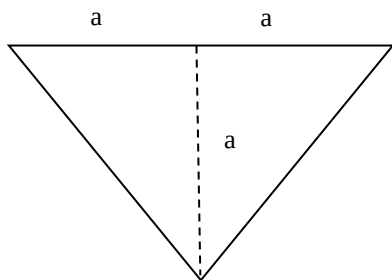


Fig. 4