DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

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

Time allowed: 1hour **Date:** 10 Oct 2015
Venue: LH 410 **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 position of the elastic and plastic neutral axes for the section shown in Fig. 1.

(5 marks)

Q2. Determine the term K_{22} of the stiffness matrix for the non-prismatic plane frame member with a profile following sine function, as shown in Fig. 2. The sectional properties of the beam, such as area and moment of inertia follow sine function and the values at the end of the beam are A_o and I_o. The numbering of the degrees of freedom shall be as for normal 2D plane frame structures.

(8 marks)

Q3. Derive the flexibility matrix of the structure shown in Fig. 3, such that it should enable you to determine the deflection under the load P (i.e. at C) and the rotation at B. Assume both members have constant EI = L/6.

(7 marks)

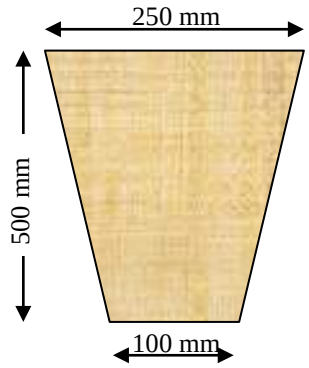

Fig. 1

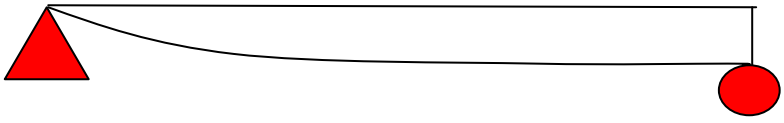

Fig. 2

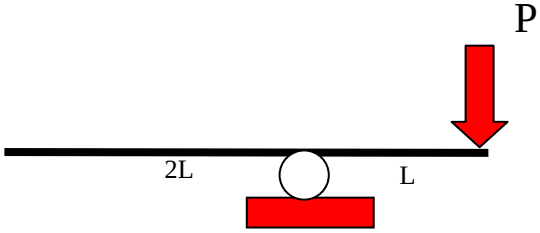

Fig. 3