CE 3310: Advanced Structural Analysis

Tutorial - 6 : Plane and Space Frames (Matrix Methods)

Take ***P* = 100 + last two digits of your Roll No** (kN).

1. (a) Analyse the plane frame shown in Fig. 1, considering a concentrated load *P* kN acting downwards at the rigid joint O. Analyse by the conventional Stiffness Method, and draw the axial force, shear force, bending moment and deflection diagrams. Assume both the frame elements to have a uniform square cross-section, 300×300 mm with an elastic modulus, $E = 2.5\times10^4$ N/mm^2.

   (b) Analyse the same frame when it is subjected to a uniform drop in temperature by 40^{o}C and no external load. Assume the coefficient of thermal expansion, $\alpha = 11\times10^{-6}$ per ^{o}C.

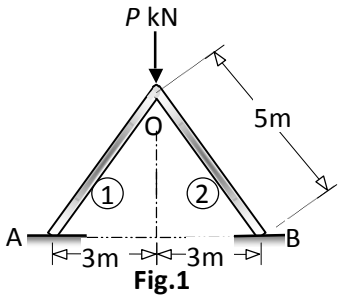

Fig.1

2. Analyse the anti-symmetric frame shown in Fig. 2 by the Reduced Stiffness Method. Assume all elements to have a size 300×300 mm and an elastic modulus, $E = 2.5\times10^4$ N/mm^2. Draw the deflection, bending moment, shear force and axial force diagrams. Consider axial deformations to be negligible. Take advantage of the hinged support at D.

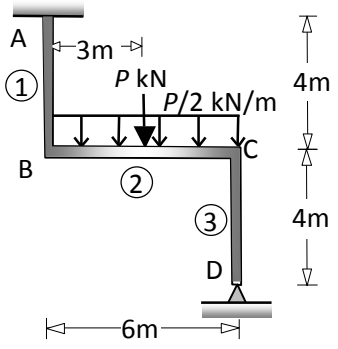

Fig. 2