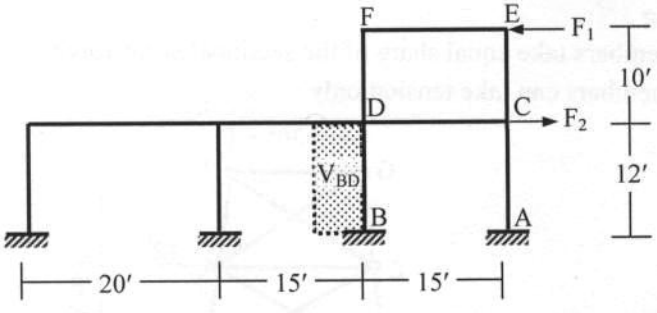
University of Asia Pacific
Department of Civil Engineering
Final Examination Spring 2012
Program: B.Sc. Engineering (Civil)

Course Title : Structural Engineering II
Time : 3 hours

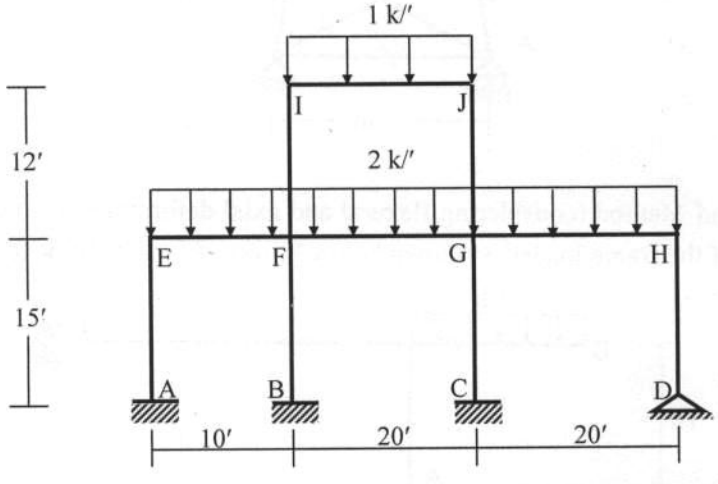
Course Code: CE 313
Full Marks :10x10=100

(There are **14** questions. Answer any **10)**

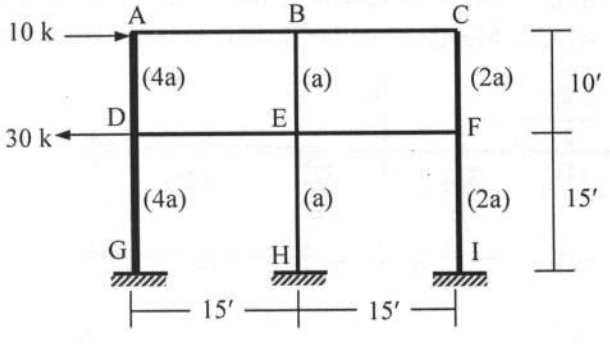
1. The figure below shows the applied loads (F_1, F_2) and shear force (V_{BD}) in column BD of a two-storied frame. If $F_2 = 40$ k, and $V_{BD} = 10$ k, use the Portal Method to calculate the
   (i) applied load F_1
   (ii) bending moments of column BDF.



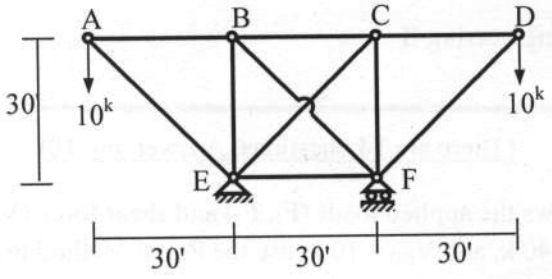
2. Analyze the two-storied frame structure loaded as shown below using the approximate location of hinges to draw the bending moment diagrams of the beams and columns.



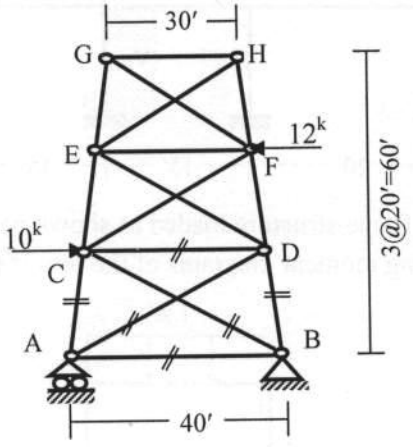
3. For the structure shown below, use the Cantilever Method to draw BMD of all the columns and beams. The cross-sectional areas of the columns are given in the parenthesis.



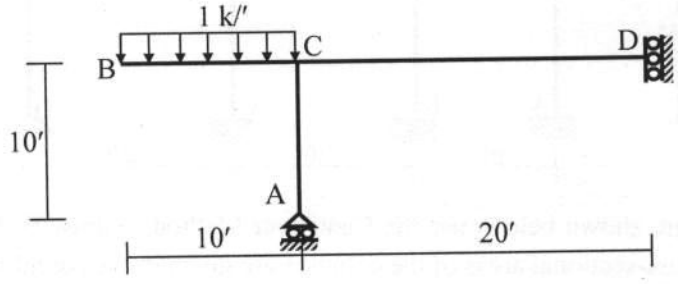
4. Use the Method of Virtual Work to calculate the vertical deflection at point A of the truss loaded as shown, assuming diagonal members to take equal share of the sectional shear [Given: EA/L = constant = 500 k/ft] .



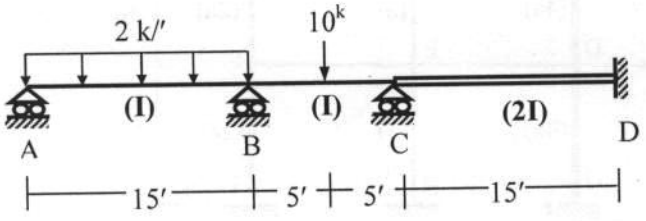
5. Calculate the member forces AB, AC, AD, BC and BD of the statically indeterminate truss shown below assuming
   (i) Diagonal members take equal share of the sectional shear force
   (ii) Diagonal members can take tension only.



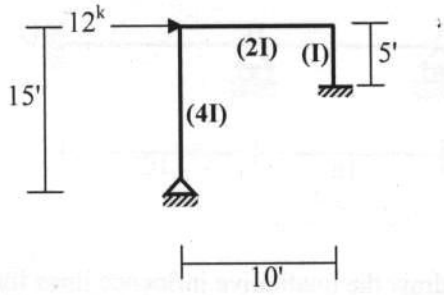
6. Use the Unit Load Method (considering flexural and axial deformations) to calculate the vertical deflection at D of the frame loaded as shown below [Given: EI = 40×10^3 k-ft^2, EA = 400×10^3 k].



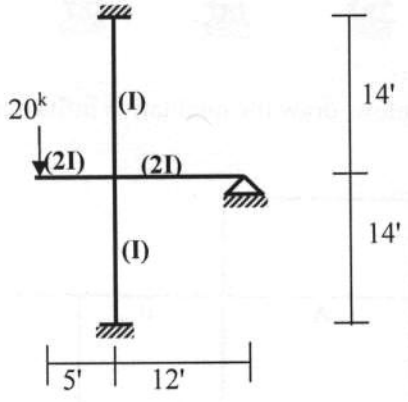
7. Use the Moment Distribution Method to calculate the joint moments and draw the bending moment diagram of beam ABCD. Member inertia (I) is given in the parenthesis.



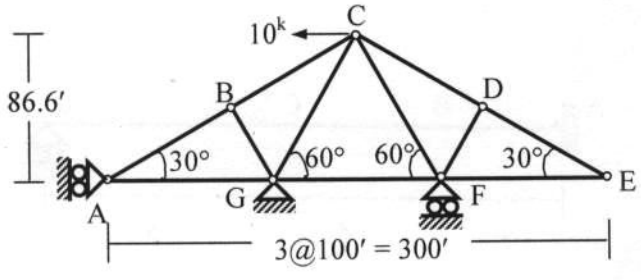
8. Use moment distribution method to draw SFD and BMD for the following frame. Member inertia (I) is given in the parenthesis.



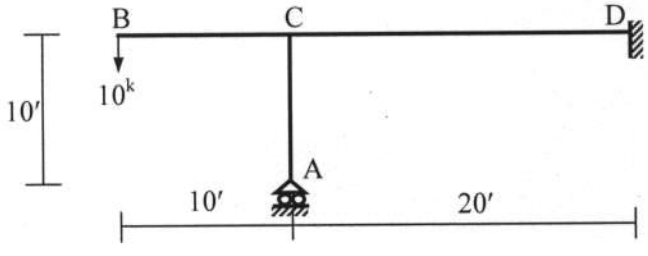
9. Use moment distribution method to draw SFD, BMD and deformed shape of the following frame. Member inertia (I) is given in the parenthesis.



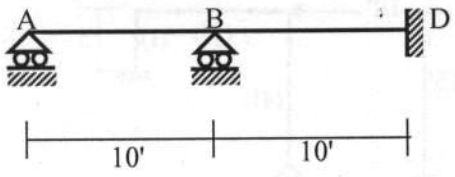
10. Use the Flexibility Method to calculate the member force of the truss loaded as shown below [Given: EA/L = constant = 1000 kip/ft].



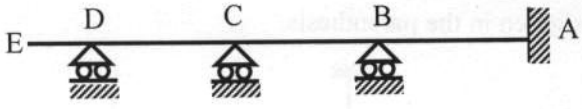
11. Use the Flexibility Method (considering flexural deformations only) to draw the bending moment diagram of the frame shown below, if in addition to the applied load, support D settles 0.10′ downward [Given: $EI = 40\times10^3$ k-ft^2].



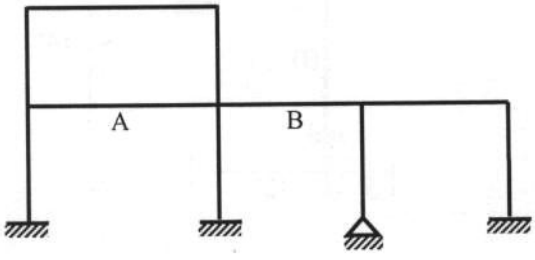
12. Use the Flexibility Method (considering flexural deformations only) to draw the bending moment diagram of the beam shown below if support B settles 0.1' [Given: EI = 40×10^3 k-ft^2].



13. i) For the beam shown below, draw the qualitative influence lines for V_A, $V_{B(R)}$, $V_{D(L)}$ and M_D.



ii) For the frame shown below, draw the qualitative influence lines for V_A and M_B.



14. Draw the influence line for the vertical reaction at A and determine the quantitative value at B and C [Given: EI = constant].