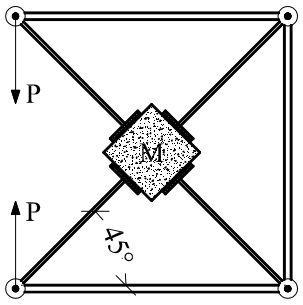
Theory of Structures - BCE	June 4, 2011	Time: Three Hours
Third Year	Final Exam-First Attempt	**Closed Book & Notes**

Note: **Answer 4 (four) Questions**

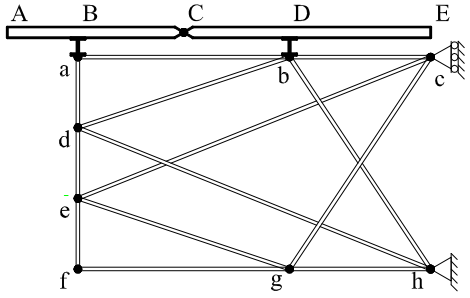
Dr. Bassman R. Muhammad
Dr. Wael S. Baldawi

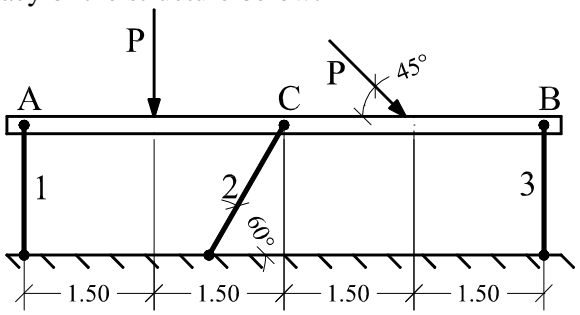
Q1: **(25%)** Answer one of the following:

1. To produce biaxial compression of a concrete cube "M", the system of **hinged** bars shown in figure below is used. Find the compressive forces exerted on the faces of the cube. The frame has the form of a square and the inclined bars lie along its diagonals. Assume P = 400 kN.

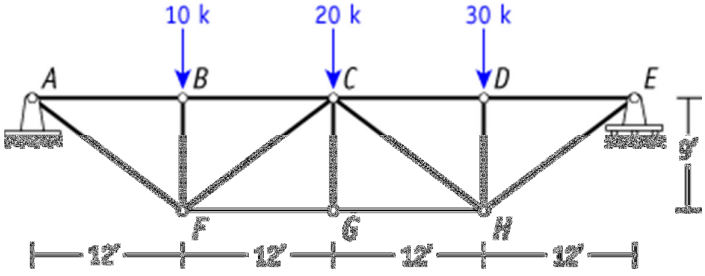


2. Discuss the stability and determinacy of the structure below:



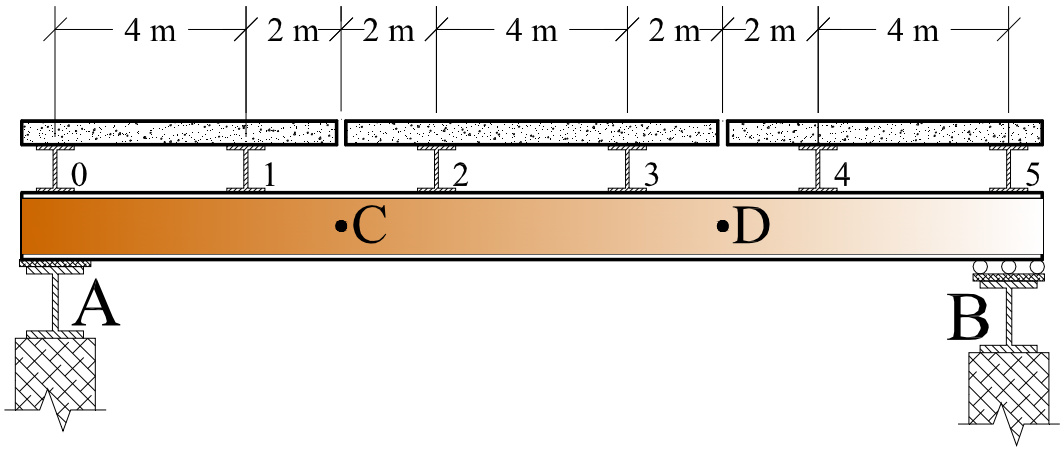


Q2: **(25%)** Using the method of virtual work (Unit Load), determine the vertical deflection at joint G in the truss below, under the loading condition shown in figure below.
The member properties are A=2 in^2 and E=29x10^3 kip/in^2, all dimensions are in ft. (1ft. =12in.). (Letter k on the figure represents kilo pounds).

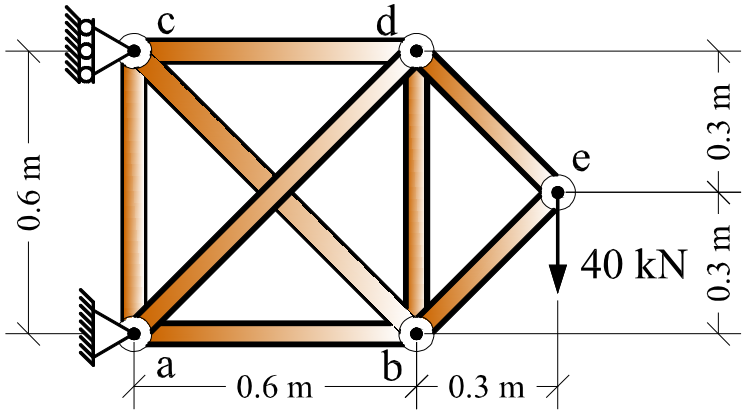


Q3: **(25%)** Construct the influence lines for the girder with floor system shown in figure below for the following cases:

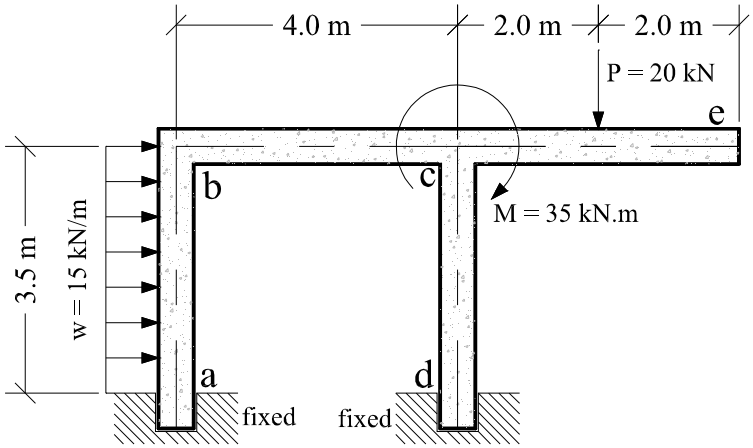
i. Vertical reactions at ends "**A**" and "**B**" for the girder.
ii. Floor beam reactions at panel points "**2**" and "**3**".
iii. Shear in panels "**1-2**" and "**2-3**" of the girder
iv. Bending moment at panel point "**2**" and section "**D**" of the girder.



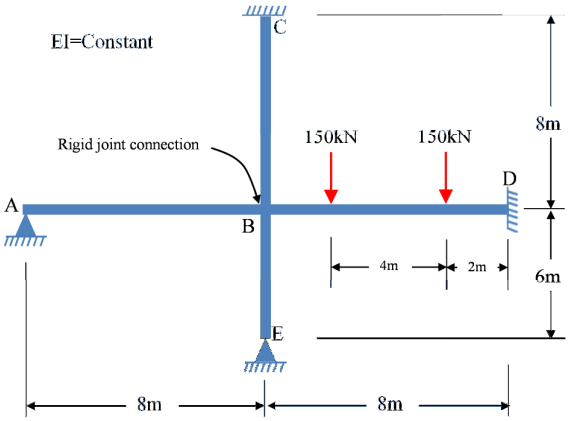
Q4: **(25%)** Referring to figure below, using the Consistent Deformation Method, find the axial forces in members **ad** and **bd** due to the action of the vertical load P = 40 kN. Each bar has constant flexibility value, (f = L/AE = constant).



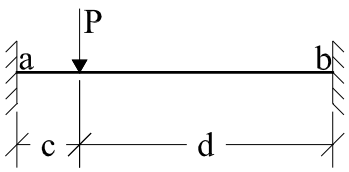
Q5: **(25%)** Using the Slope Deflection Method, construct a bending moment diagram for member **bc** for the frame subjected to the action of loading shown in the figure below. Assume that the flexural rigidity (EI) for all frame members is constant. Neglect the weight of structure.



Q6: **(25%)** By using the **MOMENT DISTRIBUTION** method, find the moments at joints C and D for the frame shown in the figure below.



Note:



$FEM_{ab} = - P\,c\,d^2 / (c + d)^2$ and $FEM_{ba} = + P\,c^2\,d / (c + d)^2$

Good Luck