University Of Technology
Building and Construction Eng. Dept.
Final Exam – First Attempt – 2010/2011

Subject :Design of Steel Structures | **Class:4th. year**
Branch :structural Eng. | **Time : 3 Hours**
Examiners :Dr. M. j. Hamoodi | **Date : 16th June 2011**
Dr. wael Shawky

Open Books and Notes
Attempt four questions only

Q_1: Select the lightest (2C12 x w) member HE in the truss shown in Figure(1) using 1in gusset plate. Design the end connection (no. of bolts, spacing and edge distance) then draw the connection and discuss all modes of failure. Finally, check the slenderness of the member and the longitudinal spacing of bolts. Use Fy=50ksi and Fu=65ksi for the channels and the gusset plate. The A490 bolts with 7/8 in diameter slip critical connection and standard holes are used.

Q_2: a) Member AB is loaded as shown in Fig. (2). It has a section of structural Tubing (rectangular), 10 x 6 x 5/16. Find the load P if k_y=1and F_y=36ksi and EI=constant. Note: joint A and C are simple connections (hinges) .

b) Design a base plate for a column having an axial load of 700Kips and an eccentricity of 3.5in. The ratio e/N must be equal to 7/52. The steel column section is W12x152 (Fy=50ksi). The base plate material is A36steel. The concrete pedestal has a compressive strength (fc')of 3ksi and a dimension of 52in x 52in.

Q_3:Design member AB, which is within the frame shown in Fig(3).The member has an axial compressive force of 152 kip and end moments at A and B of 287 kip.ft and 144 kip.ft clockwise, respectively. Use k_y=1 and F_y=36ksi.Section $W_{14 \times w}$ is available. Check for the interaction formulas only.

Q_4: In order to connect two beams, a simple framed connection is used. Design this connection if the beam section is W30 x 211 and the coped deep is 2.5in. The end shear reaction is 200kip. Connect the angles to the beam by using 1in diameter A490 bolts bearing type connection when threading are not included in the shear plane and standard holes are used. For the beam (Fy=36ksi and Fu=58ksi). For the angles (Fy=50ksi and Fu=65ksi).

Q_5: Use plastic design method to select the $W_{12 \times w}$ section for the continuous beam shown in Fig. (4). The given loads are service load. lateral supports are provided at the support and under the concentrated loads. Give sketch for the needed lateral supports. F_y = 60ksi.

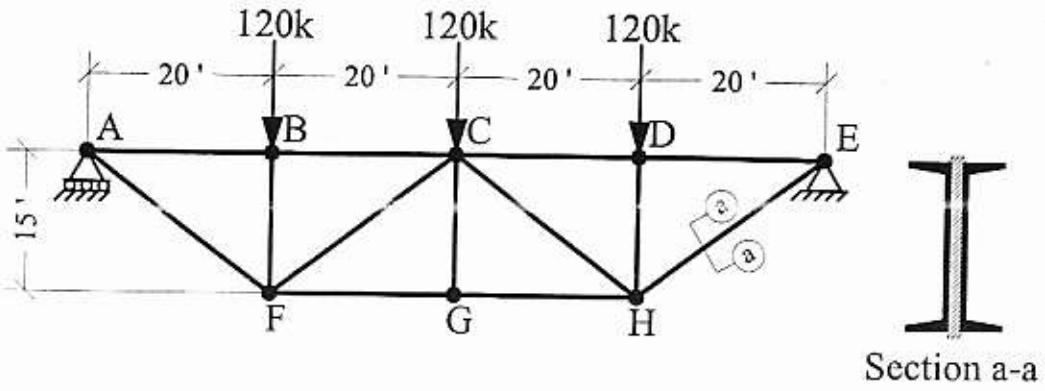

Fig.(1)

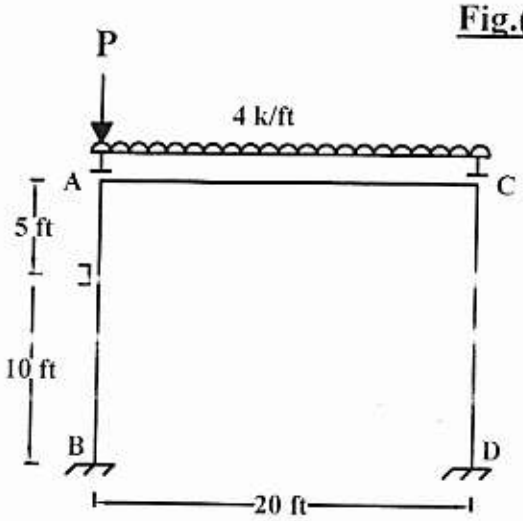

Fig.(2)

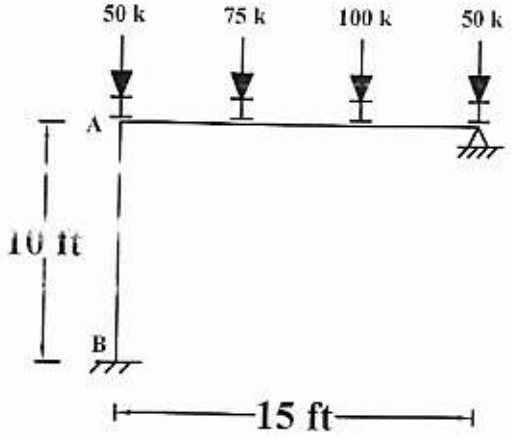

Fig.(3)

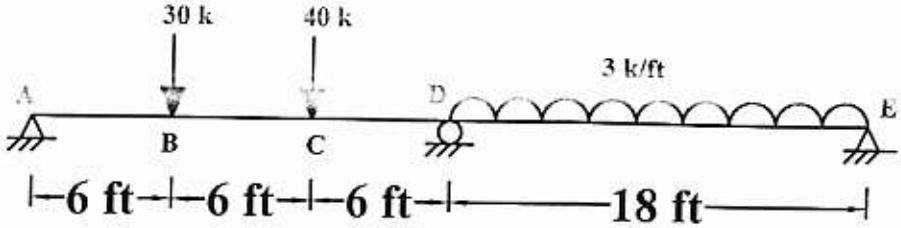

Fig.(4)