BANGLADESH UNIVERSITY OF PROFESSIONALS
Military Institute of Science and Technology
B.Sc. in Environmental, Water Resources, and Coastal Engineering, Term Final (Spring) Examination 2023: Jul-Sep 2023

Student Group: Earned Credit Hours > 108

Subject: EWC 411, Structural Analysis and Design II

Time: 3.00 hours **Full Marks: 180**

INSTRUCTIONS:

a. Use **SEPARATE** answer scripts for each section.
b. **Question-1** in **Section-A** and **Question-5** in **Section-B** are compulsory
c. Answer any other **TWO** questions out of **THREE** from each section.
d. Figures in the margin indicate full **marks**.
e. Assume reasonable data if necessary.
f. **Symbols** and **abbreviations** used have their usual meanings.

SECTION-A

Question 1 **(Compulsory)**

a. Determine the moment and reactions at the supports of the beam shown in Figure 1a by using Flexibility Method. Consider EI = constant. **20**

b. Solve the structure shown in Figure 1b and draw the Shear Force and Bending Moment Diagram. Use Flexibility Method. Consider EI = constant. **10**

Question 2

a. Using Stiffness Method, calculate the followings of the beam shown in Figure 2a. **20**
   i. Deflection and rotation at B
   ii. Reaction at the supports (A, C)
   iii. Draw Shear Force and Bending Moment Diagram.

b. Derive the Stiffness matrix of the beam shown in Figure 2b. **10**

Question 3

a. Determine the moments of the frame as indicated in Figure 3a using Stiffness Method. Consider EI = constant. **20**

b. Determine Stiffness matrix of the Shear Frame as shown in Figure 3b. **10**

Question 4

a. Analyze the frame shown in Figure 4 using Flexibility Method and draw the Shear Force, Axial Force and Bending Moment Diagram. **30**

SECTION-B

Question 5 **(Compulsory)**

a. Analyze the beam shown in Figure 5 using moment distribution method and draw the shear force and bending moment diagrams. **24**

b. Draw qualitative influence line for shear force at E and F and moment at C of the beam shown in Figure 6. **06**

Question 6

a. Analyze the plane frame shown in Figure 7 using moment distribution method and draw shear force and bending moment diagrams. **20**

b. Determine the member end moments for the two span beam shown in Figure 8 due to a settlement of 20 mm at support B and 0.05 radian clockwise rotation at support A.
Consider, E = 70 GPa and I = 8×10^{8} mm^{4} **10**

Question 7

a. Analyze the frame shown in Figure 9 and calculate the side sway of point C. Use moment distribution method and consider EI = constant. **20**

b. Determine the support moment at A of the non-prismatic beam shown in Figure 10 by using moment distribution method. **10**

Question 8

a. Analyze the plane frame of Figure 11 using moment distribution method and determine moments and reactions at support E. **18**

b. For the continuous beam of Figure 12, determine the ordinate of influence line at every 2ft interval for support reaction R_A. **12**

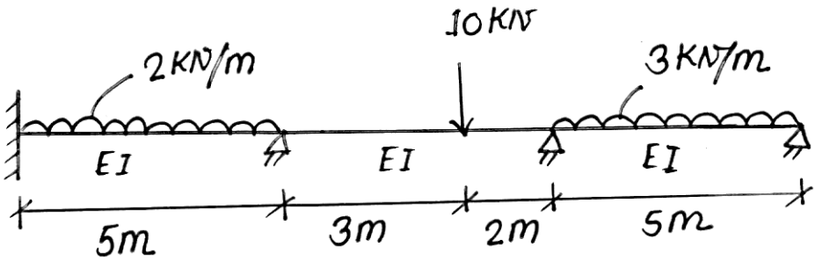


Figure 1a

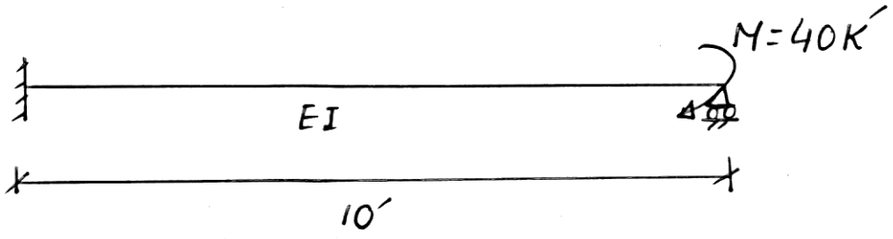


Figure 1b

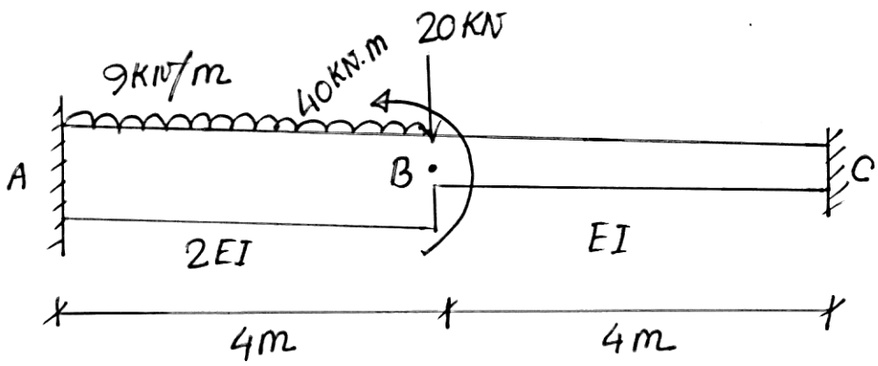


Figure 2a

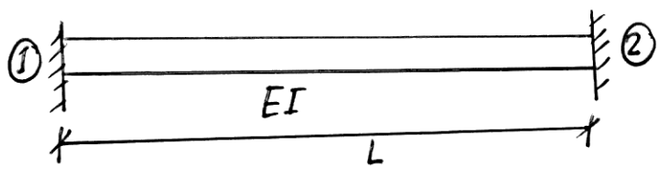


Figure 2b

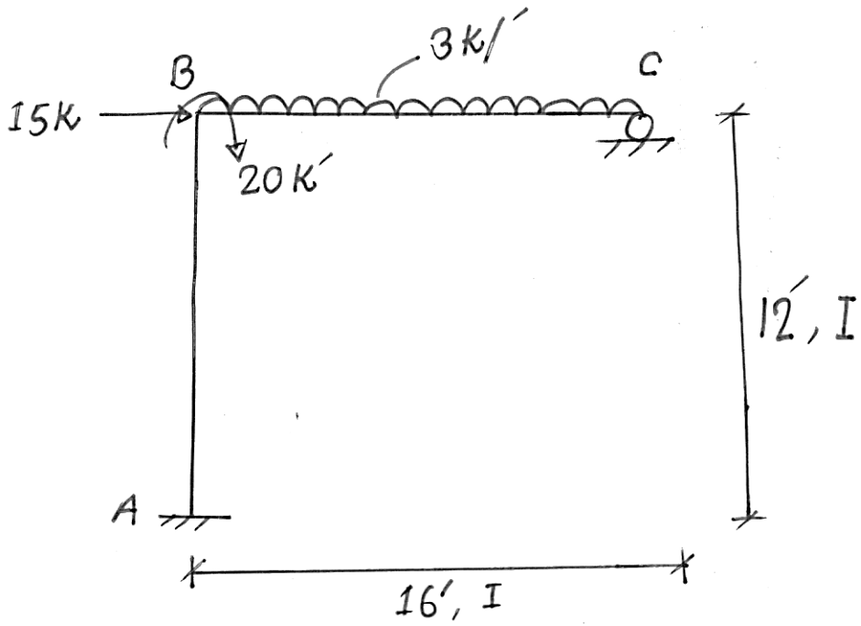


Figure 3a

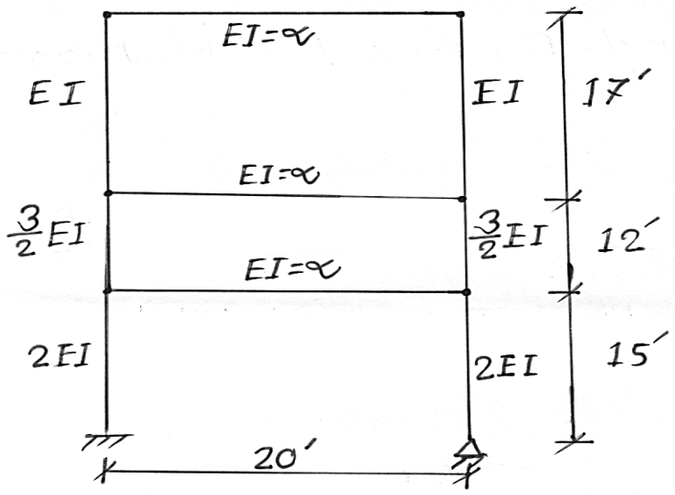


Figure 3b

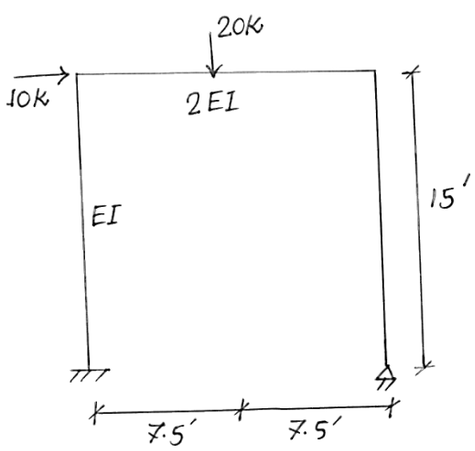


Figure 4

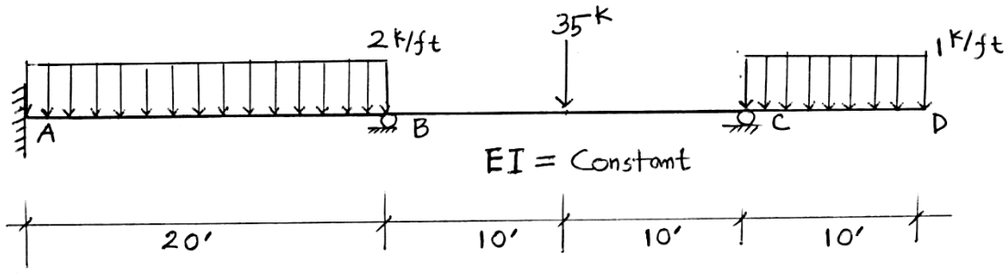


Fig. #5

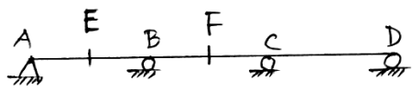


Fig. #6

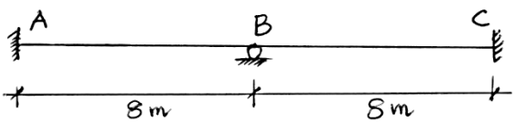


Fig. #8

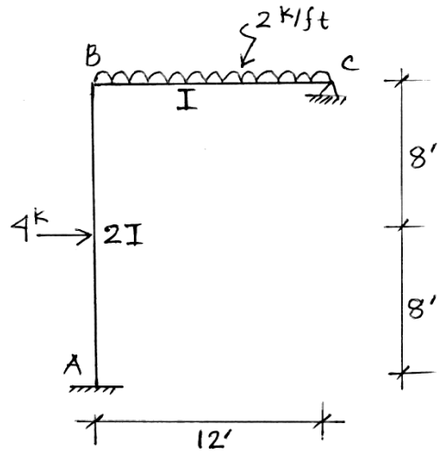


Fig. #7

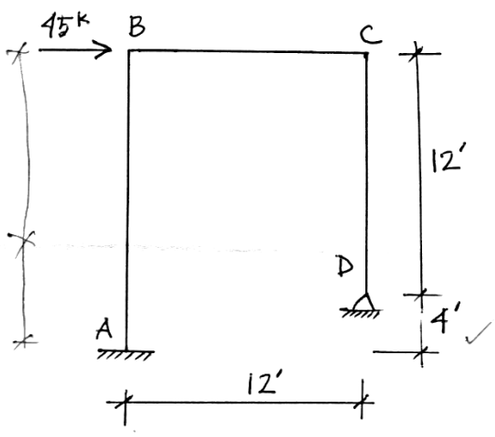


Fig. #9

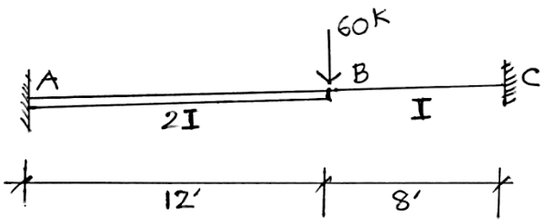


Fig. 10

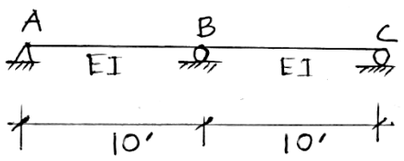


Fig. #12

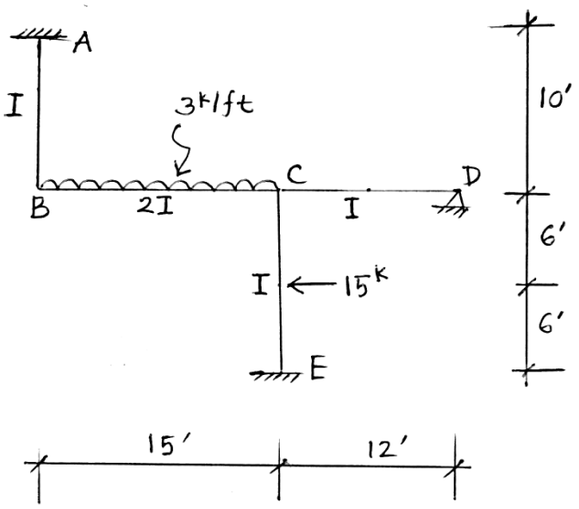


Fig. #11