BANGLADESH UNIVERSITY OF PROFESSIONALS
Military Institute of Science and Technology
B.Sc. in Civil Engineering, Term Final (Spring) Examination 2025: Oct - Nov 2025

Student Group: Earned Credit Hours ≥108

Subject: CE 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**out of theremaining **THREE**questions from each section.
d. The information provided in Annexure may be consulted, if required.
e. Figures in the margin indicate full **marks**.
f. Assume reasonable data if necessary.
g. **Symbols**and **abbreviations** used have their usual meanings.

SECTION-A

Question 1 (Compulsory)

a. Determine support moments and reactions for the beam shown in Fig.1. **15**

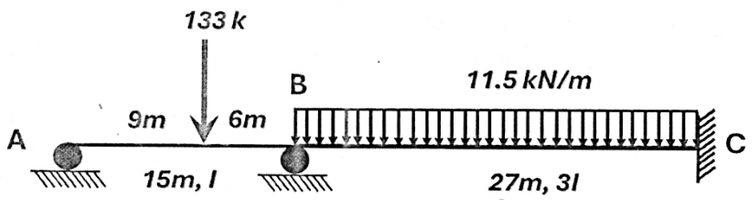


Fig.1 for question 1(a)

b. Determine the reactions of the frame (Fig.2) using direct stiffness matrix method. **15**

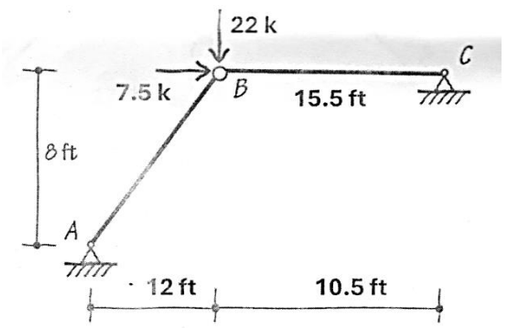


Fig.2 for question 1(b)

Question 2

a. Determine bar forces of the truss (Fig.3) using stiffness method. Cross sectional areas (in square inch) are given in parenthesis. **15**

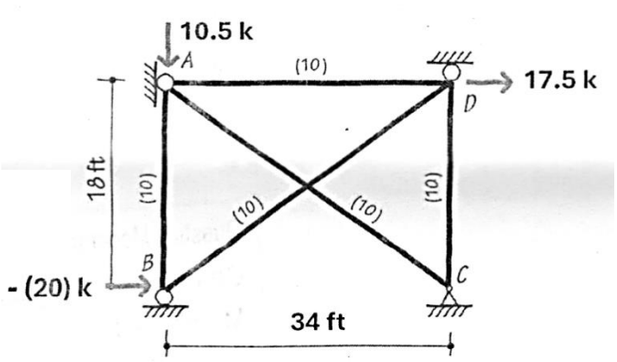


Fig.3 for question 2(a)

b. Determine support moments for the beam shown in Fig.4. (EI constant) **15**

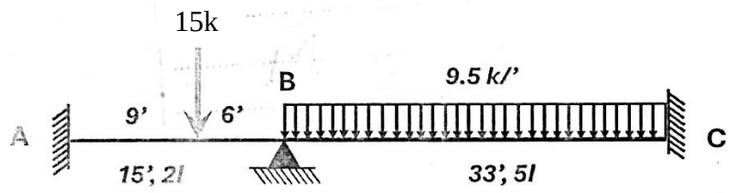


Fig.4 for question 2(b)

Question 3

a. Determine bar forces of the frame (Fig.5) using stiffness method. Cross sectional areas (in square inch) are given in parenthesis. **15**

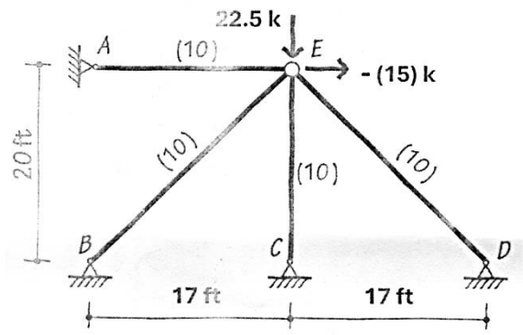


Fig.5 for question 3(a)

b. Determine the internal moments M_{AB}, M_{BA}, M_{BC} and M_{CB} of the frame as indicated in Fig.6. **15**

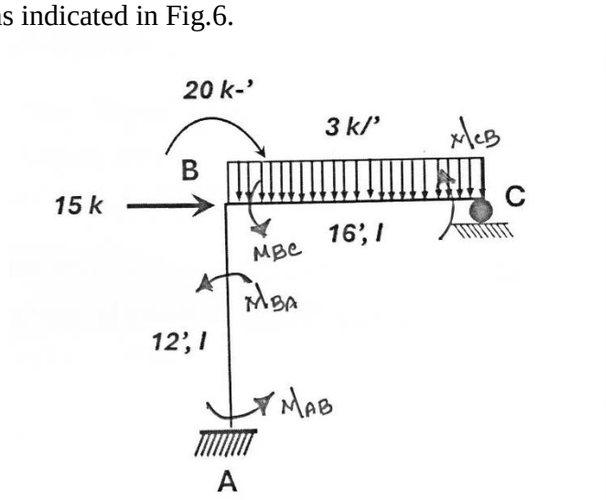


Fig.6 for question 3(b)

Question 4

a. Determine all reactions of the beam (Fig.7) using direct stiffness matrix method. **15**

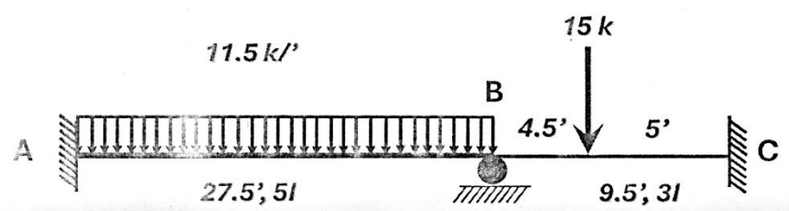


Fig.7 for question 4(a)

b. Determine support moments due to the loading and support movements (Fig.8). Support 'A' rotates 0.04 radian clockwise, and support 'D' moves up by 0.22 feet. ($EI = 3500\ K - ft^2$) **15**

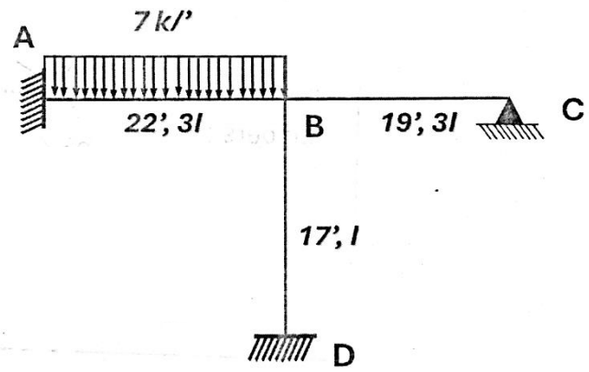


Fig.8 for question 4(b)

SECTION-B

Question 5 **(Compulsory)**

a. Determine the member end moments and reactions for the frame shown in Fig.9 by using moment distribution method. Given that, EI is constant. **20**

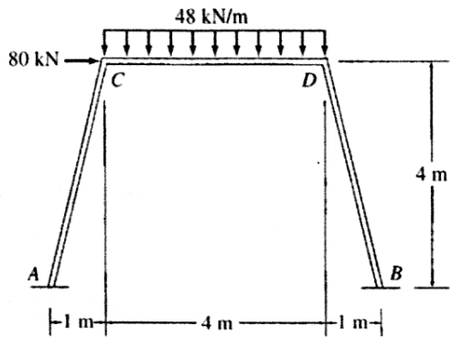


Fig.9 for question 5(a)

b. Draw the influence lines for the reaction at support B and the shear at point C of the beam shown in Fig.10 and determine the influence line ordinates at 3m intervals. **10**

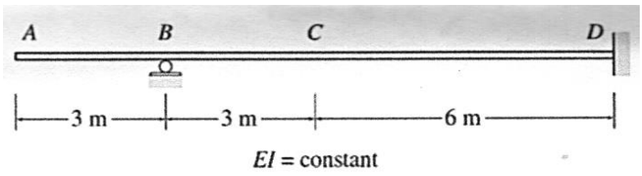


Fig.10 for question 5(b)

Question 6

a. Determine the reactions and draw the shear force and bending moment diagram for the non-prismatic beam shown in Fig.11 by using the moment distribution method. **20**

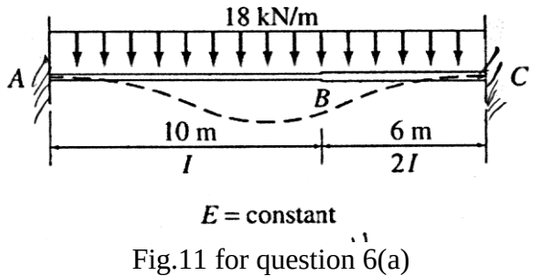
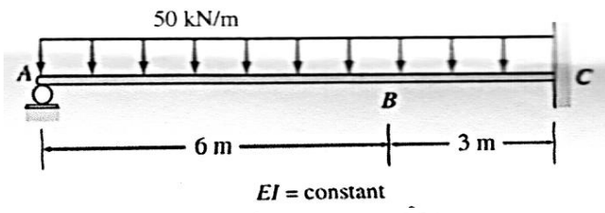


Fig.11 for question 6(a)

b. Determine the shear force and bending moment at point B for the beam shown in Fig.12 using flexibility method. Select the reaction moment at the fixed support to be the redundant. **10**



. Fig.12 for question 6(b)

Question 7

a. Draw the influence lines for the forces in members BC,BE and CE of the truss shown in Fig.13. Live loads are transmitted to the top chord of the truss. Cross-sectional area of each bar is provided in bracket. Given that, E = 200 GPa. **15**

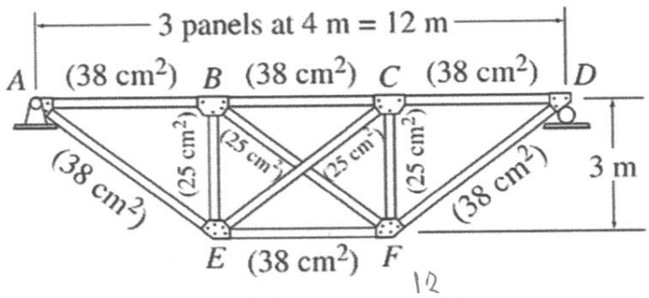


Fig.13 for question 7(a)

b. Determine the member end moments and draw shear force and bending moment diagram for the three-span continuous beam shown in Fig.14 due to the uniformly distributed load and due to the support settlements of 15mm at B, 37mm at C and 18mm at D using moment distribution method. Given that, $E = 200\ GPa, I = 3000\ x\ 10^6\ mm^4$. **15**

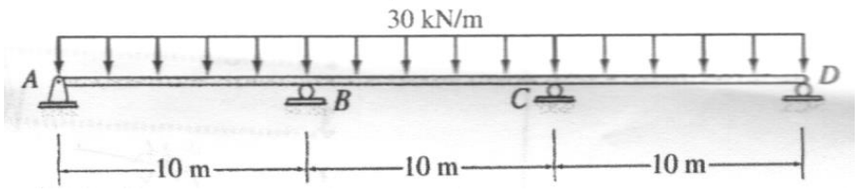


Fig.14 for question 7(b)

Question 8

a. Determine the reactions and draw the shear force and bending moment diagram for the frame shown in Fig.15 using the flexibility method. Given that, EI = constant, for all members, **25**

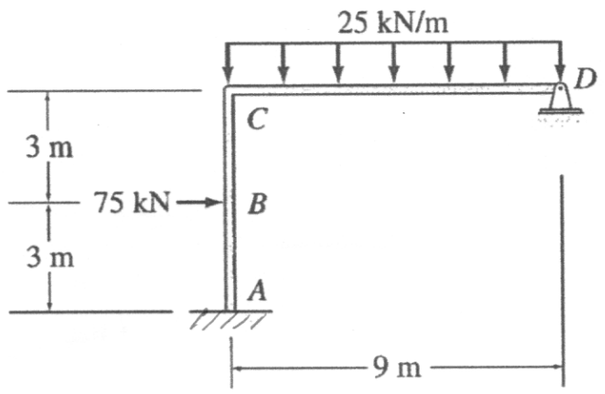


Fig.15 for question 8(a)

b. For the building frame shown in Fig.16, determine qualitatively the arrangements of a uniformly distributed downward live load 'w' that will cause the maximum negative bending moment at point A and the maximum positive bending moment at point B. **5**

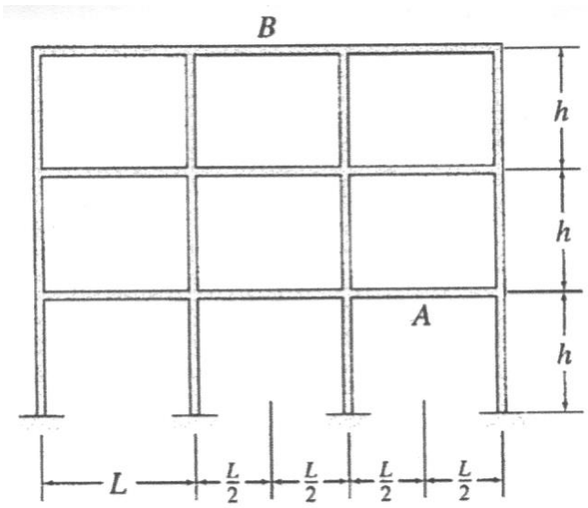


Fig.16 for question 8(b)