SE Civil - IV C- Scheme 40+40+40 +18 11.5.23 (148)

(3 Hours) [Total Marks: 80]

NOTE:

- Question No. 1 is compulsory.
- Attempt any Three out of the remaining five questions.
- Figure to the right indicates full marks. Draw neat sketches wherever necessary.
- Assume suitable data wherever required.

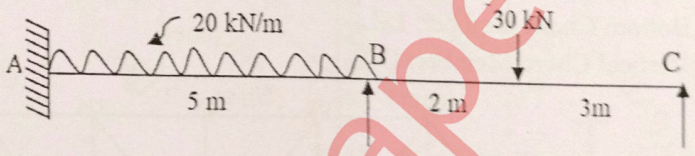
Q.1 Answer **any four** from the following.

(a) A three hinged parabolic arch has a span of 30 meters and a rise of 10m. The arch carries a uniformly distributed load of 50 kN per meter on the left half of the span. It also carries a concentrated load of 160 kN at 5m from right end. Determine the horizontal thrust at each support. 20

(b) Find the shape factor for a beam of solid circular section of radius R. 05

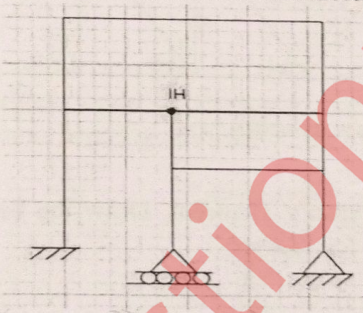
(c) A simply supported girder has a span of 15m. Two-wheel loads of 100 kN and 50 kN spaced at 2m moves on the girder. Find the bending moment that can occur at a section 8m from the left end. Any wheel load can lead the other. 05

(d) Analyse the beam using stiffness method and find the rotations. I is constant. 05

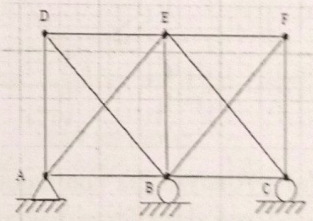


(e) Find the static and kinematic indeterminacy of the structures given below. 05

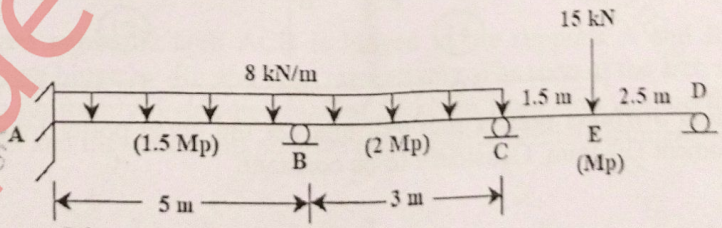
i)



ii)

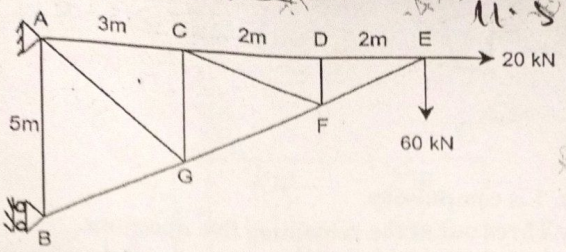


Q.2 (a) Find the Plastic Moment 'Mp' for the continuous beam given below. 08

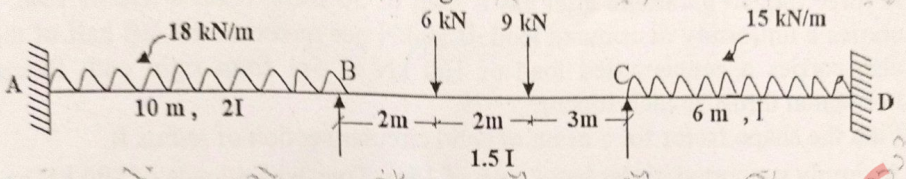


(b) Find the forces in the members of the truss given below using the method of joints. 12

SE Civil IV C-Scheme 11.5.23

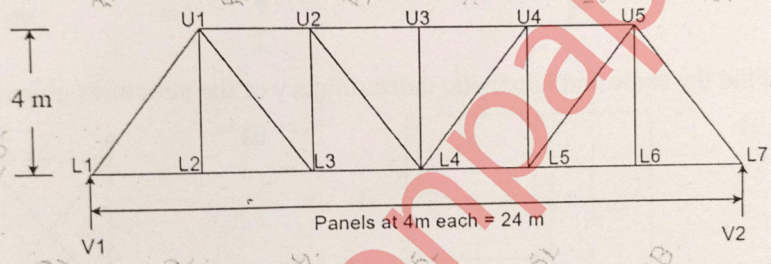


Q.3 (a) Analyse the frame given below using **moment distribution method**. Draw the bending moment and shear force diagram. 12

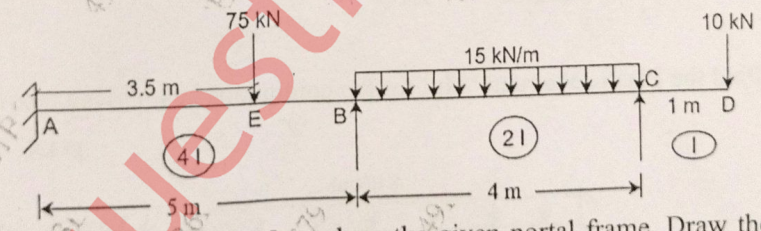


(b) Draw the influence line diagram for the following members: 08

1. Top Chord Member: U_1U_2
2. Top Chord Member: U_2U_3
3. Bottom Chord Member: L_3L_4
4. Vertical Chord Member: U_1L_2



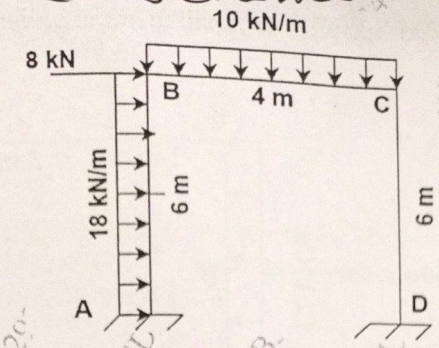
Q.4 (a) Analyse the continuous beam by Clapeyron's Theorem. Draw the bending moment and shear force diagram. 08



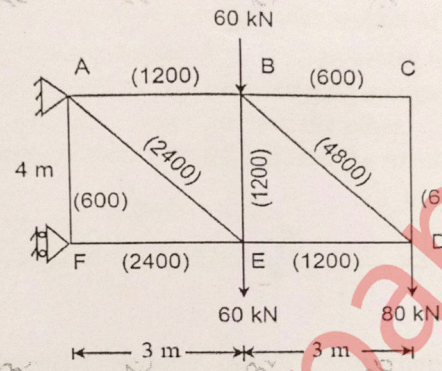
(b) Using **Stiffness matrix method**, analyze the given portal frame. Draw the Bending moment Diagram. Consider I to be constant. 12

SE Civil ED C-Scheme 11.5.23

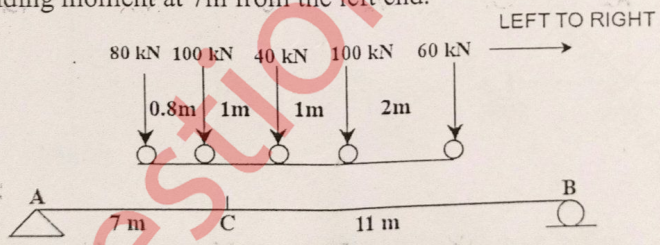
148



Q.5 (a) Find the Vertical and Horizontal deflection at D (Δ_{VD} & (Δ_{HD}) using unit load method of the truss given below. The cross-sectional areas in mm^2 of various member are given in the brackets. 12
Take E = 200 kN/mm^2.



(b) The wheel loads as shown in the figure moves over a girder of 18m. Find the maximum bending moment at 7m from the left end. 08



Q.6 (a) A three hinged parabolic arch ACB is hinged at the supports A and B which are below the crown hinge by 4m and 16m respectively. The span of the arch is 30m. The arch carries a uniformly distributed load of 55 kN/m from A to C. Find the reactions at the supports and the maximum positive and negative bending moment. 08

(b) The portal frame ABCD is loaded and supported as shown below. Use **flexibility method** for analysis, draw the bending moment diagram. AB = 2I, BC = CD = I. 12