T.E. Civil V - CBSGS
SA - II

17.5.17

Q.P.Code: 016639

(3 Hours) [Total Marks: 80]

N. B.: 1. Question number 1 is compulsory.
2. Attempt any three from remaining questions.
3. Figures to the right indicate full marks.

1. (a) To find degree of static and kinematic indeterminacy of structures as shown in figure 1. [8]

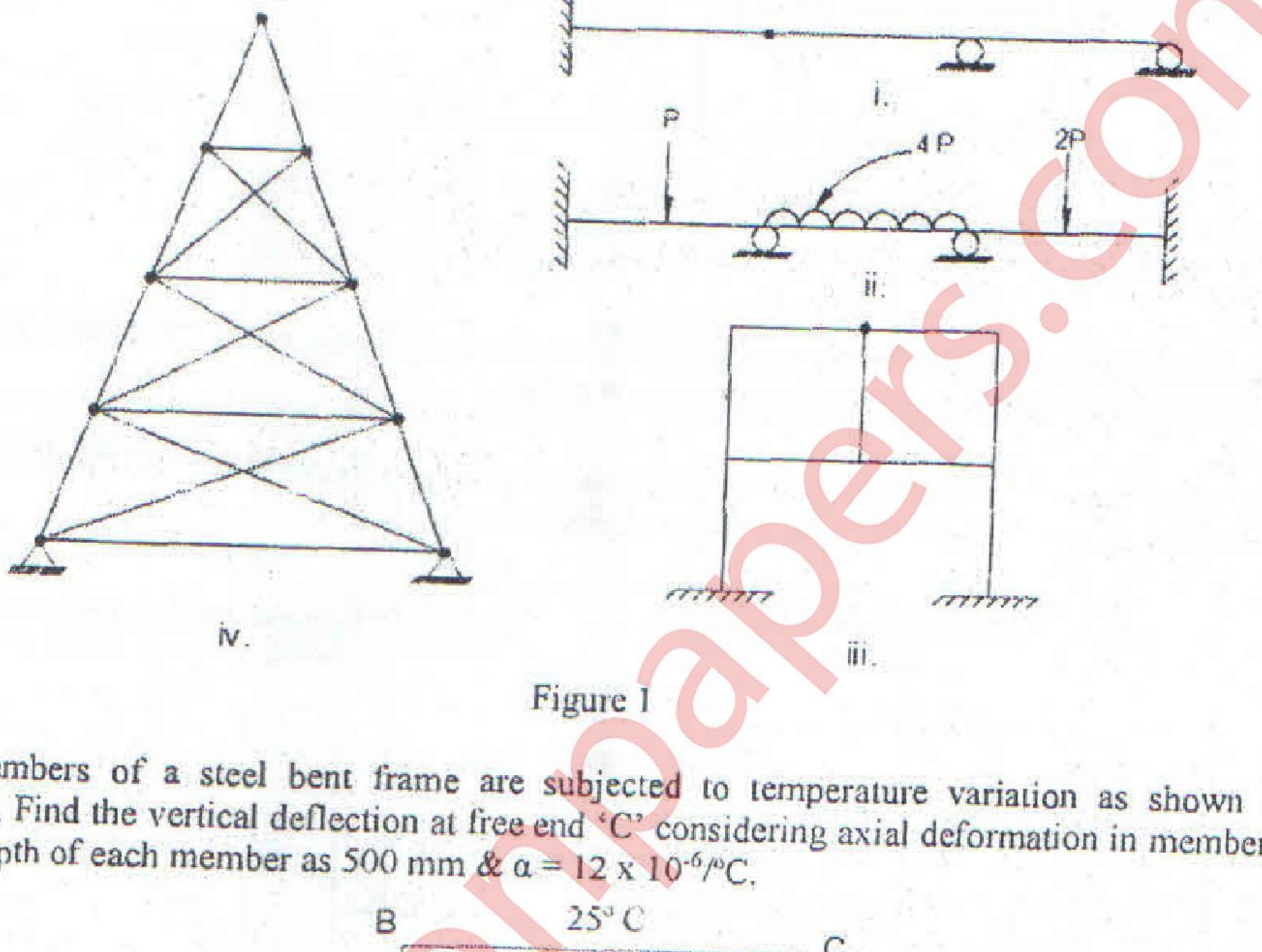

Figure 1

(b) The members of a steel bent frame are subjected to temperature variation as shown in figure 2. Find the vertical deflection at free end 'C' considering axial deformation in members. Take depth of each member as 500 mm & $\alpha = 12 \times 10^{-6}/^{o}C$. [7]

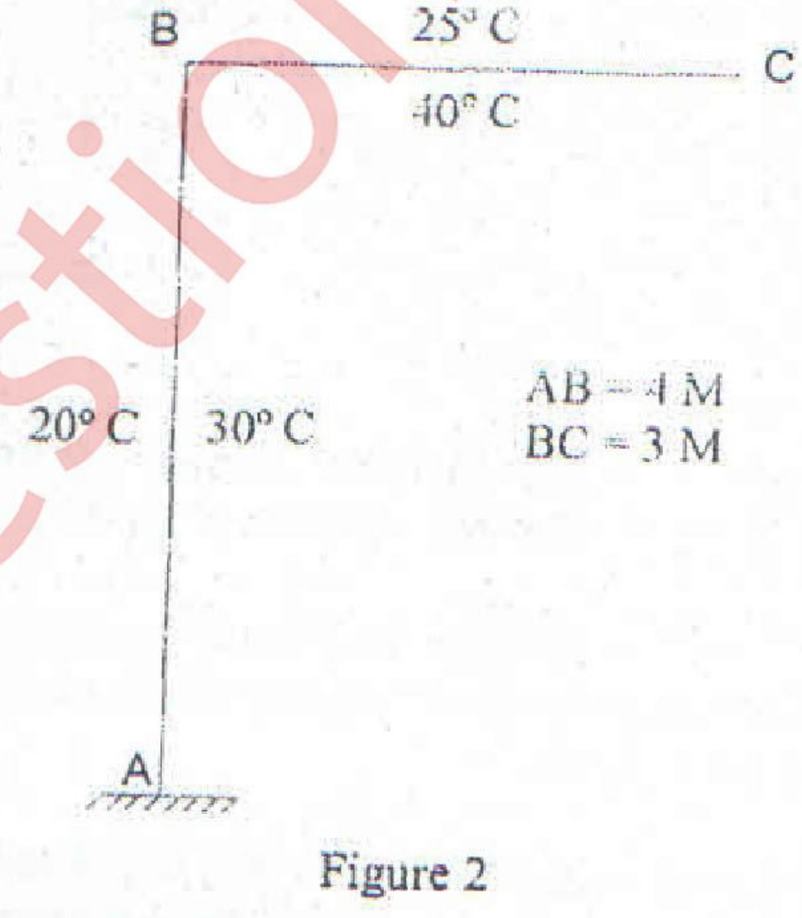

Figure 2

(c) Differentiate between Force method and Displacement method. [5]

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2. (a) Define Plastic hinge and mechanism. [2]
(b) Define Carry over factor and relative stiffness. [2]
(c) Define shape factor and load factor. [2]
(d) Analyse the continuous beam loaded and supported as shown in figure 3. Using **Clapeyron's theorem of three moments or Moment Distribution method**. The support B settles by 8mm during loading. Draw SFD & BMD. EI = 1600 kN-m^2 [14]

Figure 3

3. A portal frame ABCD is loaded and supported as shown in figure 4.Use **Flexibility method** for analysis, draw BMD and deflected shape of the frame. [20]

4. A portal frame ABCD is loaded and supported as shown in figure 4.Use **Stiffness method** for analysis, draw BMD and deflected shape of the frame. [20]

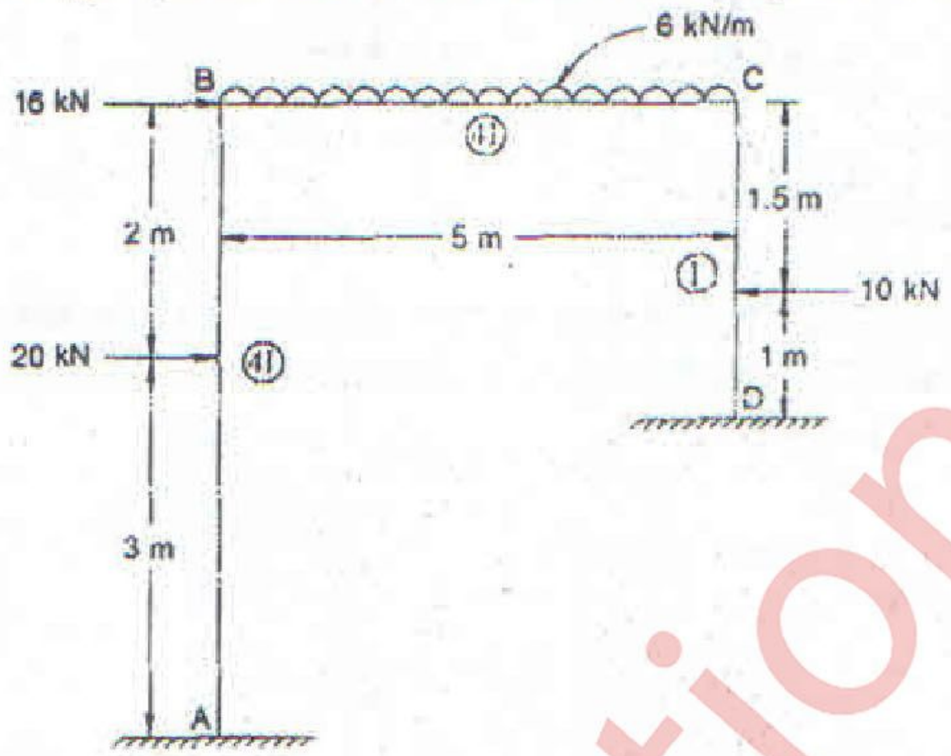

Figure 4

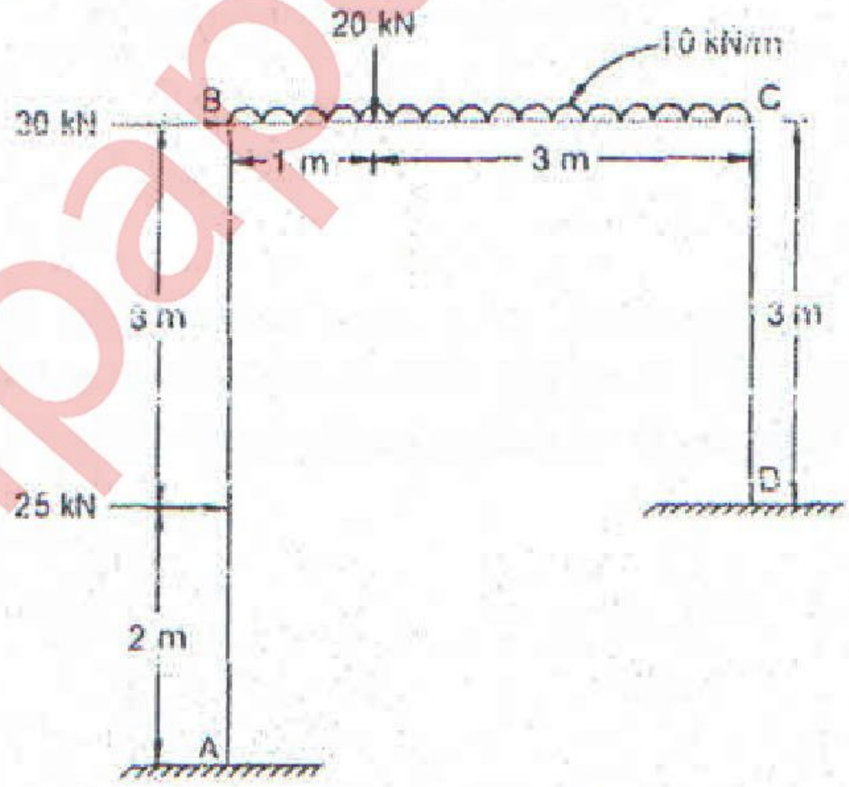

Figure 5

5. Using **Slope Deflection Method or Moment Distribution Method**, analyse the frame loaded and supported as shown in figure 5. Also draw BMD and deflected shape of the frame. [20]

6. (a) A two hinged parabolic arch of span 30 meter and rise 6 m carries uniformly distributed load of 20 kN/m on left half span and downward point load of 10kN at 5m from right hand support. Find the reaction at supports and draw BMD. [12]

OR

(a) Using Force method or least work method, Analyse the pin jointed frame loaded & supported as shown in figure 6. Also find forces in all members. Take AE constant for all members. [12]

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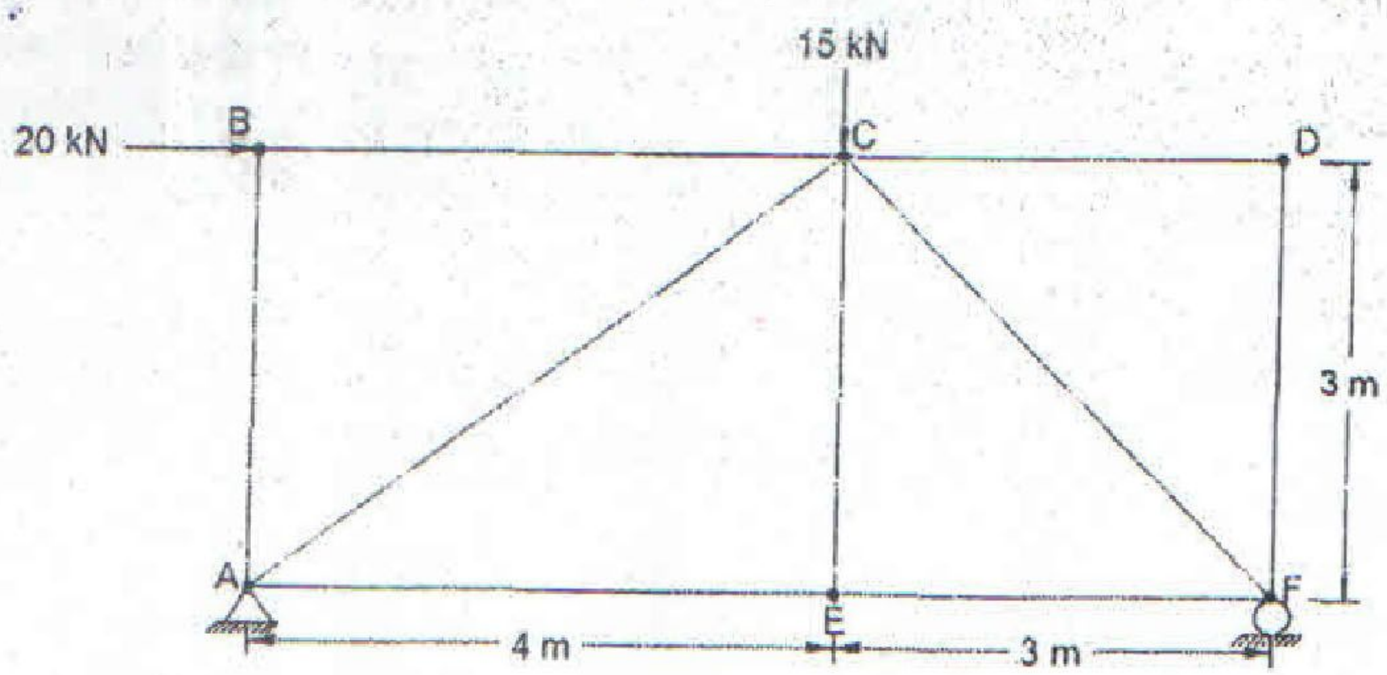

Figure 6

(b) Calculate the plastic moment capacity required for the continuous beam with working load as shown in figure 7. [8]

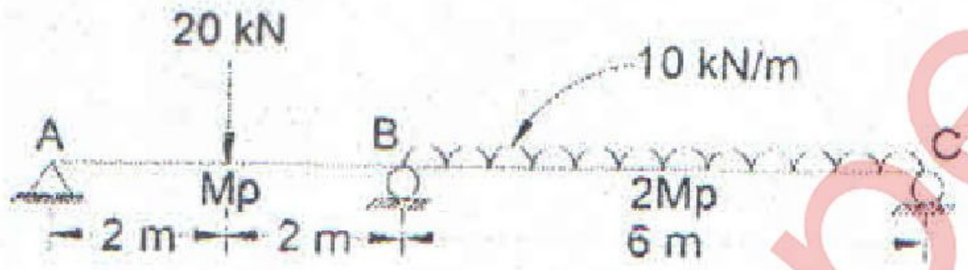

Figure 7