T.E- CIVIL- SEM V - CBCS

15 NOV 2019

[3 HRS]

[Max Marks 80]

SEAT No:

PLEASE NOTE: (1) Question No.1 is **Compulsory.**
(2) Attempt any **three** questions out of remaining five questions.
(3) Assume suitable data wherever required and state it clearly.
(4) Illustrate your answers with neat sketches wherever required.

Q1 Attempt any four from following

a) A structure is shown in Figure 1. From flexibility method and stiffness method, which method of analysis you will prefer. Explain with reason. 05

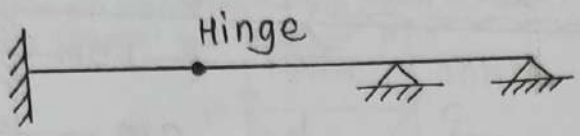

Figure 1

b) A rigid frame shown in Figure 2 is subjected to temperature variations. Determine vertical deflection at point 'C'. Take $\alpha = 12 \times 10^{-6}$ /°C Depth of all members is 600 mm. Neglect the effect of axial forces. 05

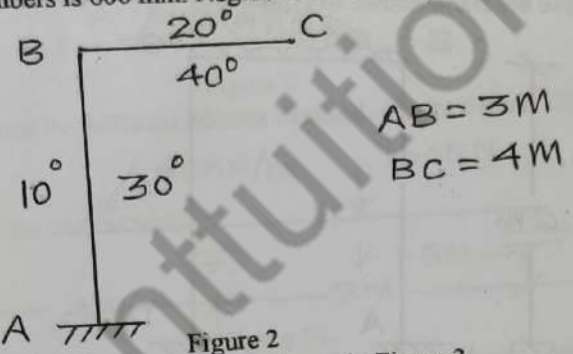

Figure 2

c) Determine the shape factor of section shown in Figure 3. 05

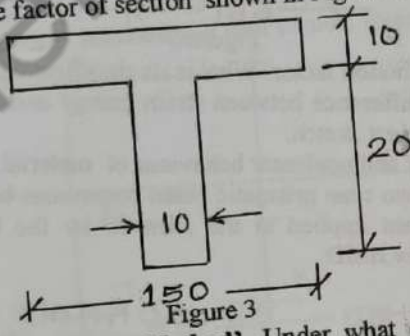

Figure 3

d) What is '**Substitute Frame Method**'. Under what circumstances this method is used. Explain with neat sketch. 05

e) A propped cantilever is shown in Figure 4 . Calculate the reaction at point B using **Theorem of Least Work.** 05

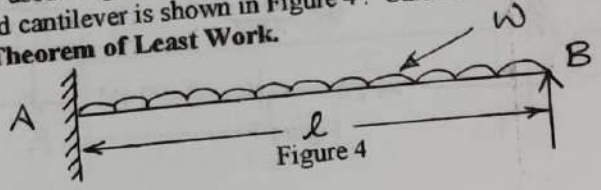

Figure 4

Q 2 a) A continuous beam ABC consists of spans AB and BC of lengths 3m and 4m respectively. The ends A and C are simply supported. The spans AB and BC carry uniformly distributed loads of 50 KN/m and 40 kN/m respectively. The moment of inertia of spans AB and BC are I and 2I respectively. Analyse the beam using **Clapeyron's Theorem of Three Moments** and draw BMD. 08

b) Analyse the beam shown in Figure 5 using **Slope Deflection Method**. Draw BMD. 12

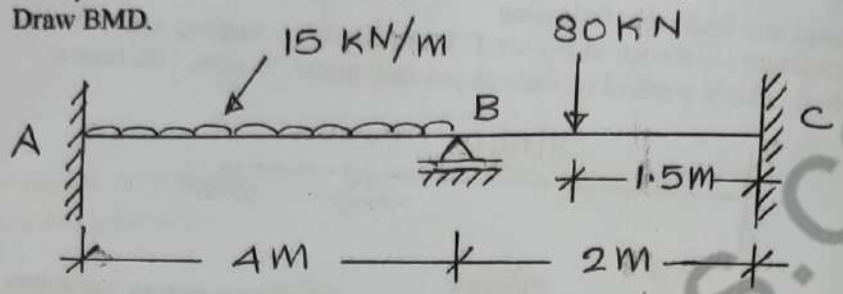

Figure 5

Q3 a) Analyse the frame shown in Figure 6 by **Kani's Method.** Draw BMD 14

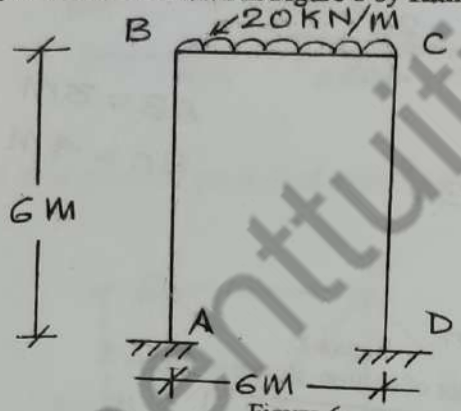

Figure 6

b) Explain distribution factor. What is its significance. 02

c) What is the difference between strain energy and complimentary energy. Explain with neat sketch. 02

d) Explain linear and nonlinear behaviour of material. 02

Q4 a) Analyse the two span prismatic beam continuous beam shown in Figure 7 with a moment applied at the joint B, by the **Moment Distribution Method**. Draw BMD. 10

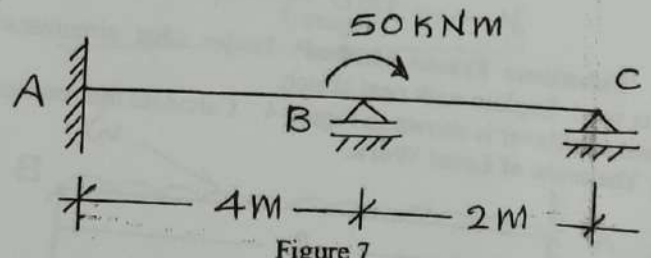

Figure 7

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b) A beam AB of span l is fixed at both ends. The beam carries a point load W at a distance l/3 from left end. The plastic moment of resistance of left half of beam is 2Mp while plastic moment of resistance of right half of beam is Mp. Find the value of load at collapse condition. Refer Figure 8. 10

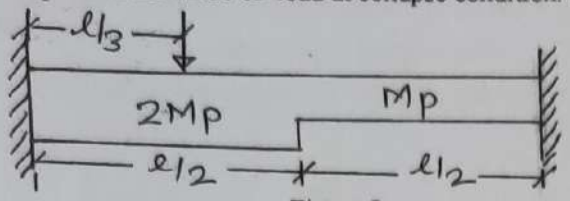

Figure 8

Q5 a) Analyse the pin jointed plane frame shown in Figure 9. Area of each member is $500\ mm^2$ and E= $2 \times 10^5\ N/m^2$ 10

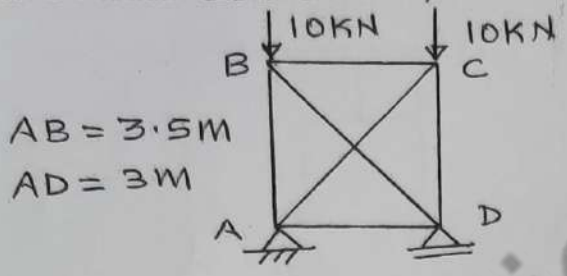

Figure 9

b) Analyse the beam by **Stiffness Matrix Method.** (Refer Figure 10) 10

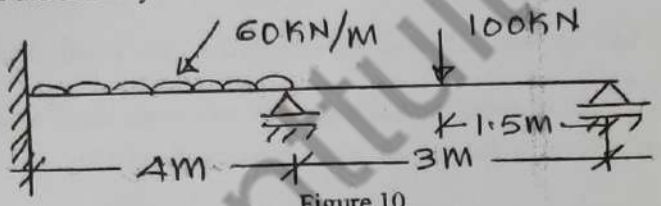

Figure 10

Q6 a) The frame shown in Figure 11 is subjected to lateral loads. Analyse the frame by **Approximate Method** and find vertical force in columns. 12

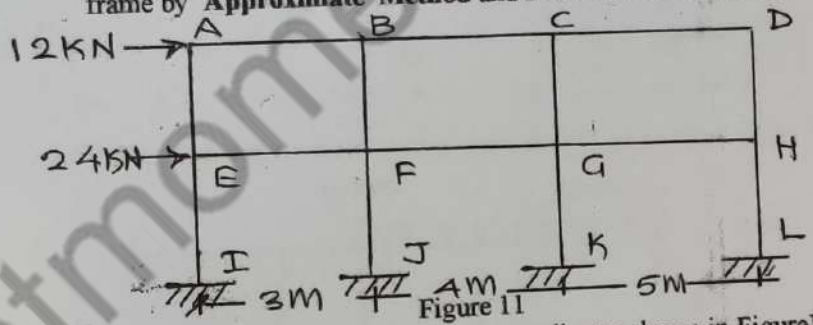

Figure 11

b) Find the **Flexibility Matrix** w.r.t co-ordinates shown in Figure12. 08

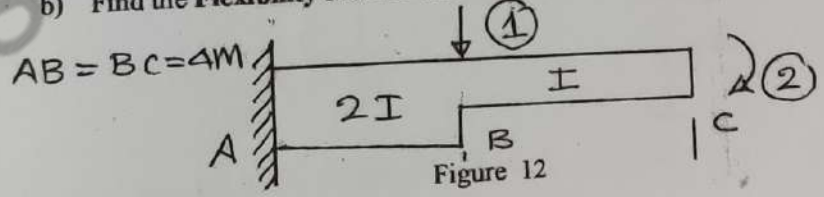

Figure 12