T. E. Sem II / CBGS / Civil Engg / 22 Nov 2016 190

SA II

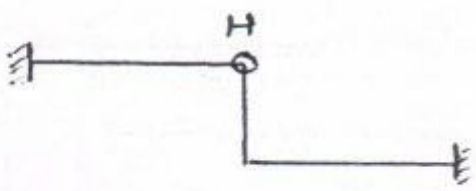
Q.P. Code : 576802

(3 Hours) **[Total Marks : 80**

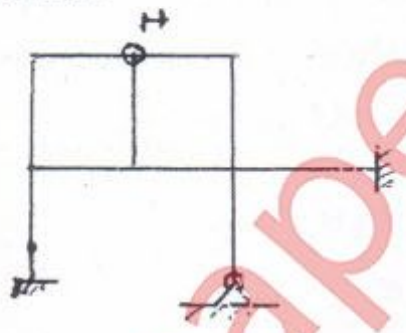
40+40+40+40+12+(13

N.B. (1) Question No. 1 is **compulsory**.
Attempt any **three** out of remaining **five** questions.
(2) Assume suitable data if necessary but justify the same.
(3) Figures to the right indicate full marks.

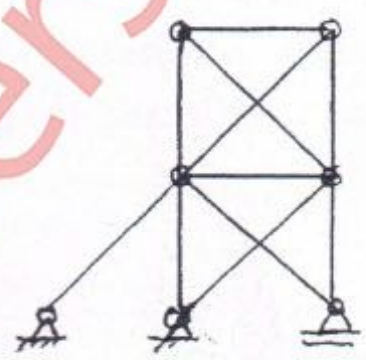
1 (a) For the structures shown, determine –
(i) Static Indeterminacy (indicating clearly external & internal) (3)
(ii) Kinematic Indeterminacy (neglecting axial deformation in flexural members)
Show clearly the joint displacements. (3)



(i)
H - Internal Hinge

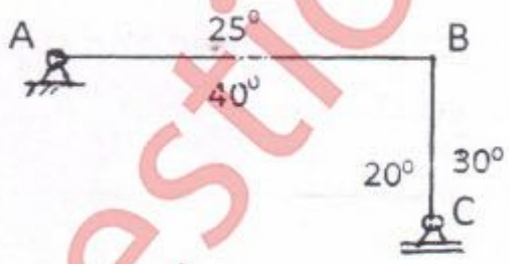


(ii)



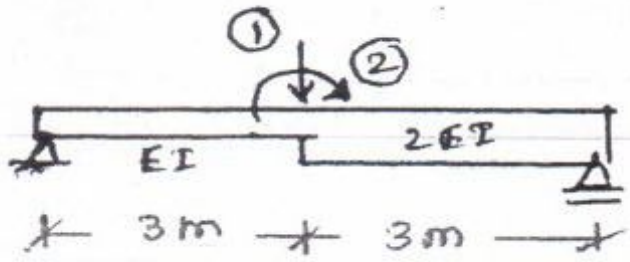
(iii)

(b) Compute the slope at support 'A' of the rigid jointed frame shown in figure due to temperature variation as indicated. Take $\alpha = 12 \times 10^{-6}$ /°c and depth of each member = 600 mm. Consider the effect of axial deformation. (6)



Lengths
AB = 6m
BC = 4m

(c) Develop the flexibility matrix **OR** stiffness matrix for the non - prismatic beam w.r.t. coordinate 1 and 2 as indicated. (4)



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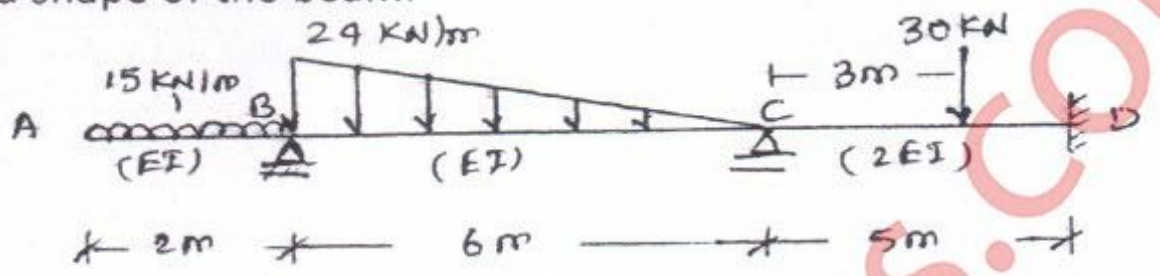
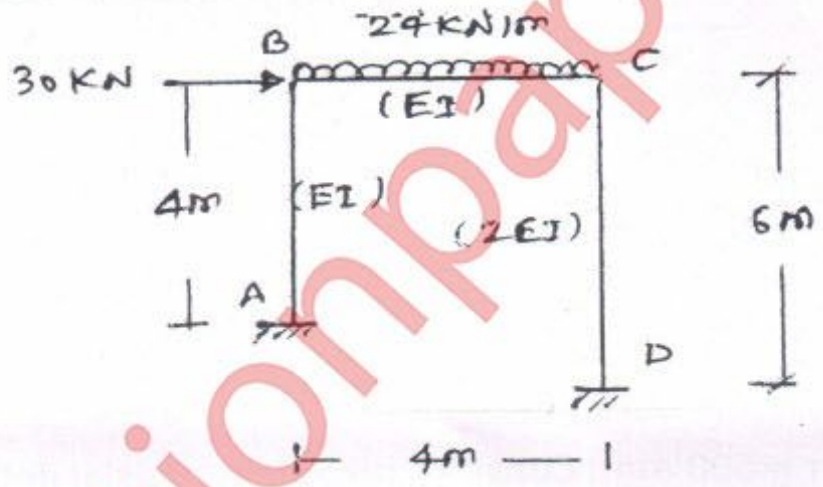
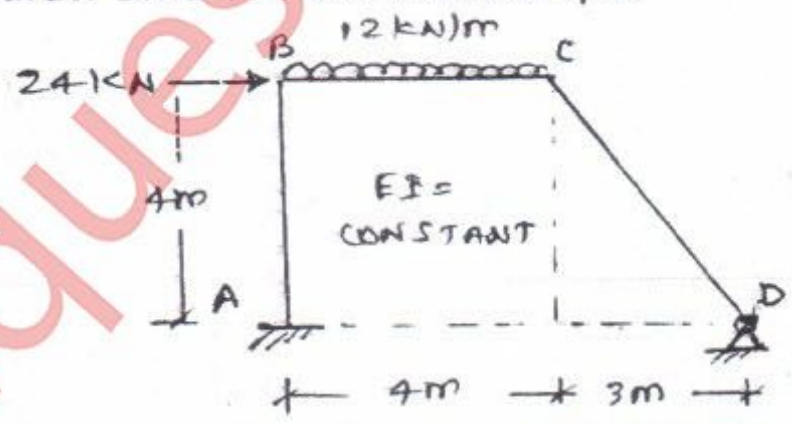
2 Analyse the continuous beam loaded as shown using Moment Distribution Method **OR** Clapeyron's Theorem of three moments. Also draw SFD, BMD and deflected shape of the beam. (16)



3 A rigid jointed plane frame loaded as shown in figure. Analyse this frame using Stiffness method **OR** Slope-deflection method. Also draw BMD and deflected shape of the frame. (16)



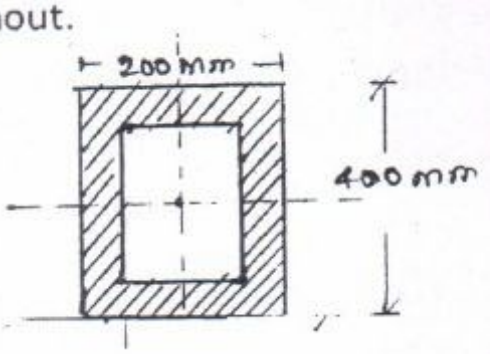
4 Using flexibility method, analyse the frame loaded and supported as shown in figure. Also draw BMD and deflected shape. (16)



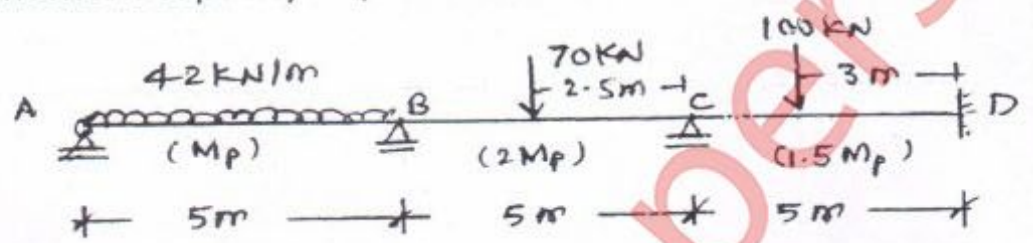
5 (a) Define the terms- (i) Shape factor (ii) Load factor (iii) Plastic hinge (4)

OR (a) State & explain theorem of least work. (4)

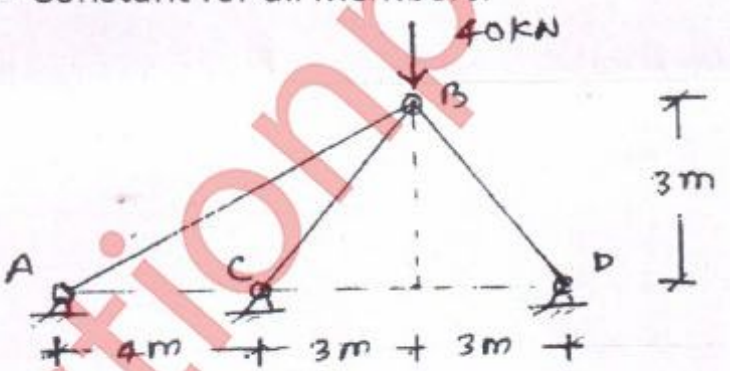
(b) Find the shape factor for the beam of box section as shown. Assume wall thickness = 50 mm throughout. (4)



5 (c) A continuous beam subjected to loading at collapse as shown. Determine the plastic moment capacity 'M_p' of the beam. (8)



6 (a) Using Force Method, analyse the pin jointed plane frame loaded as shown in figure. Take AE = Constant for all members. (8)



(b) A three hinged symmetrical parabolic arch of span 30 m and central rise 5 m is subjected to udl of 30 KN/m over right half portion of the arch. It also carries a point load of 40 KN at the crown position. Find support reactions and draw BMD for the arch, indicating clearly the position & magnitude of maximum + ve and -ve bending moment. (8)