SE – Sem-IV – Old – Civil – 8A-I 25/5/16

Q. P. Code : 537902

Old Course

3 Hours Total Marks :100

N.B. (1) Question No.**1** is **compulsory**.

(2) Attempt any **four** questions out of **remaining** questions.

(3) Assume suitable **data** if required but **justify** the same.

1 Attempt any **four** of following.

a State Maxwell's reciprocal theorem and Betti's theorem. **(5)**

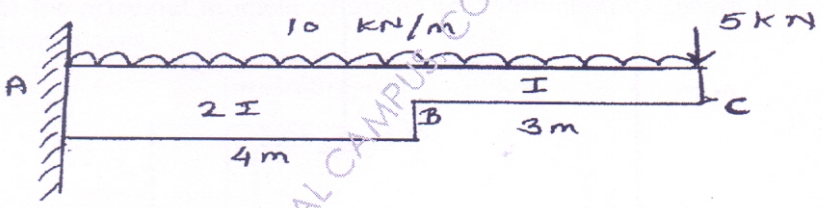
b Enlist various methods for finding deflection in structures. Also state suitability of each method. **(5)**

c Explain unsymmetrical bending and product of inertia. **(5)**

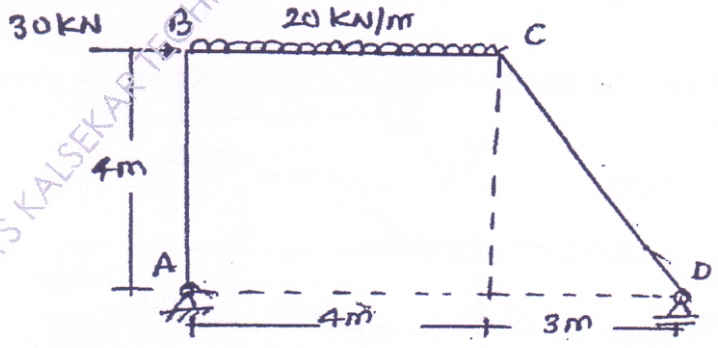
d A symmetric cable of span 40m and central dip 4m subjected to intensity of 15kN/m. Find maximum and minimum tension in cable. **(5)**

e What are the internal forces acting at any section of a (i) Arch (ii) Cable (iii) Pin jointed frame (iv) Rigid jointed frame? **(5)**

2 **a** Find the slope and deflection at free end using moment area method. **(10)**



b Draw SFD, BMD and AFD for the frame as shown in figure. **(10)**



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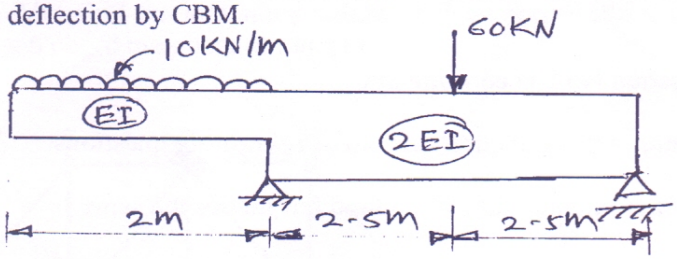
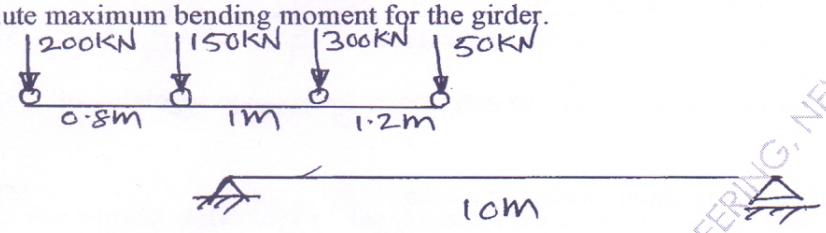
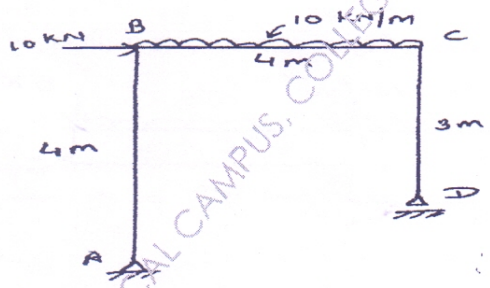
3 a For the beam supported and loaded as shown in figure find the position and magnitude of maximum deflection by CBM. **(10)**



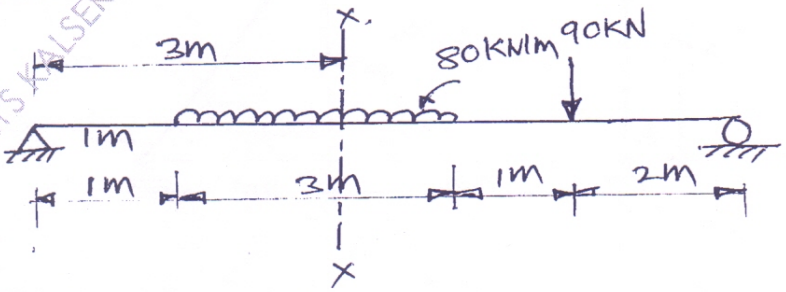
b The load shown in figure moves from left to right on a girder of span 10m find the absolute maximum bending moment for the girder. **(10)**



4 a For the rigid jointed frame shown in figure, determine the horizontal displacement of roller support D. Take E= 200GPa, I= $4x10^8$ mm^4. **(15)**



b Using Influence lines find out the shear force at a section for loaded girder as shown in figure. **(5)**



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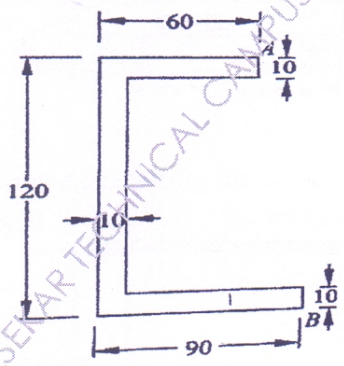
5 a A column of hollow circular section with 200mm external diameter and 100mm internal diameter is of length 4m. The column is pinned at both ends. The column carries a load of 100kN at an eccentricity of 40mm. Find the stresses produced at extreme fibre of the column section. Take E= 200Gpa. **(8)**

b A symmetrical three hinged parabolic arch ABC hinged at A, B and crown is of span 20m and central rise of 5m carries UDL of 20kN/m on left half of the arch and point load of 120kN at the crown. Determine – **(12)**

a. Support Reactions.
b. Normal Thrust and radial shear force at left quarter point.
c. Maximum BM in portion AC and BC. (Draw neat Sketch)

6 a The cable of a suspension bridge has a span of 50m and a central dip of 6.25m. Each cable is stiffened by a girder hinged at ends at mid span. There is a uniform dead load of 10kN/m over the whole girder and in addition a live load of 32kN/m, 12m long. Find the maximum cable tension when the live load is situated on the half of stiffening girder with its right end over the central hinge. **(10)**

b Determine the principal moment of inertia for the section as shown in figure and locate principal axes. **(10)**



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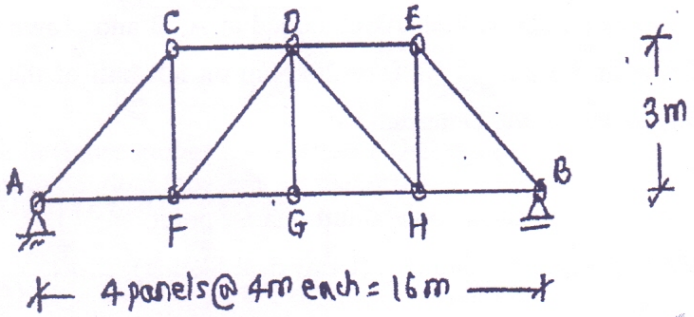
7 a Draw ILD for axial force in the members AC and DG of simply supported bridge truss shown in figure. Also find the maximum values of these forces if a load of 90kn moves along the top chord members. **(10)**



b **(10)**

Find the vertical deflection of the truss shown in figure at the joint C. Cross-sectional areas in mm^2 of all the members are shown in figure. Take $E = 2 \times 10^5$ N/mm^2.