Seat No. | | | | | | |

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BAI1309

Theory of Structures - I
(New) (1070)

P. Pages : 5

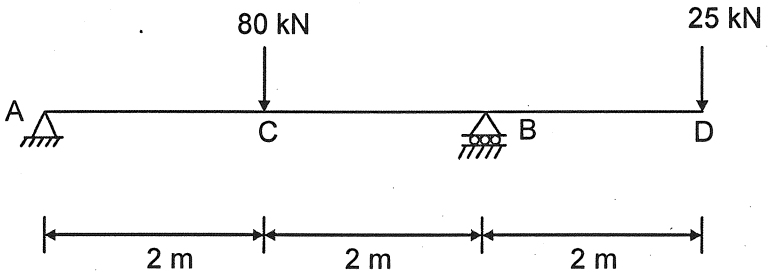
Time : Three Hours **Max. Marks : 100**

Instructions to Candidates :

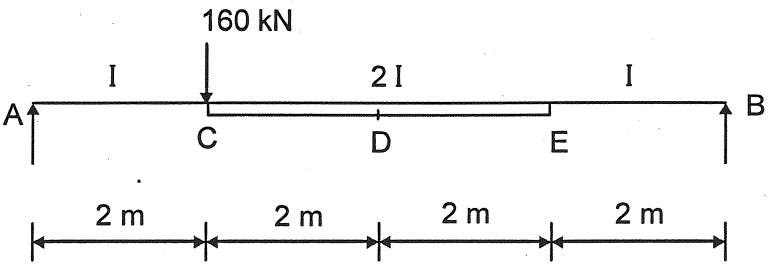
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer **any two** questions from each unit.
5. Figures to the right indicate full marks.
6. Assume suitable data if necessary.
7. Use of non-programmable calculator is allowed.

UNIT - I

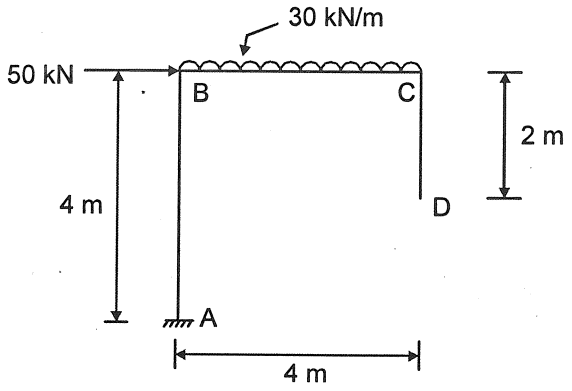
1. Determine the slope and deflection at 'D' for the beam shown in fig. EI is constant throughout. Use moment area method. **10**



2. Determine the rotations at A, B, C, E and deflection at C, D & E in the beam shown. Use conjugate beam method. **10**

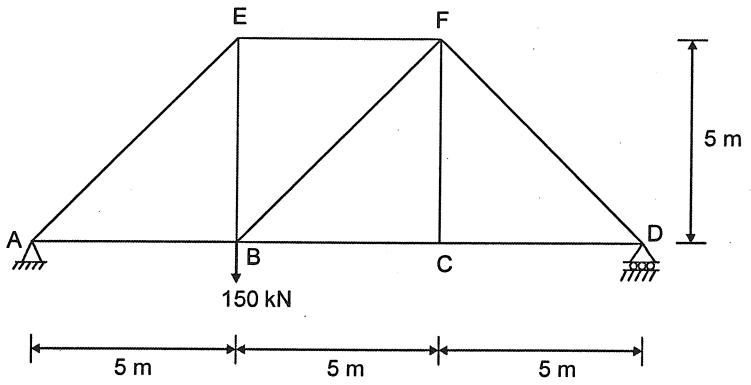


3. Determine the vertical displacement at the free end 'D' in the frame shown. Take $EI = 12 \times 10^{13}\ N-mm^2$. Use cantigliano's theorem. **10**

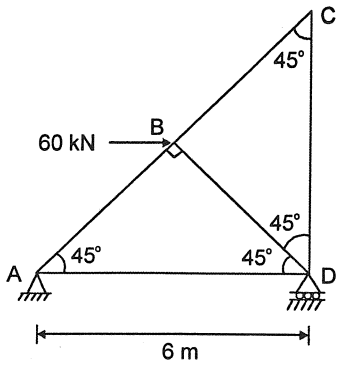


UNIT - II

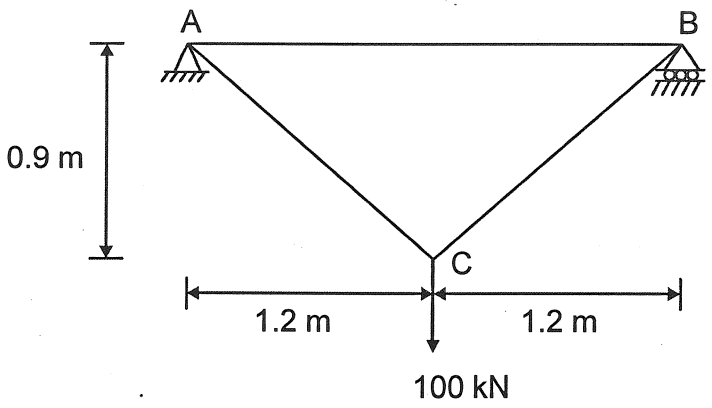
4. A steel truss of span 15m is loaded as shown. The cross sectional area of each member is such that it is subjected to a stress of $100\ N/mm^2$. Find the vertical deflection of the joint 'C'. Take $E = 200\ kN/mm^2$. **10**



5. Each bar of the truss has a cross sectional area of $600\ mm^2$ and $E = 200\ kN/mm^2$. Calculate the horizontal deflection of joint 'C' due to,
a) loading shown b) member AB being 8 mm too short. **10**



6. Determine the vertical and horizontal displacement of the joint 'C' of the frame shown. The cross-Sectional area of AB is 500 mm^2 and that of AC and BC are 750 mm^2, E = 200 GPa. **10**



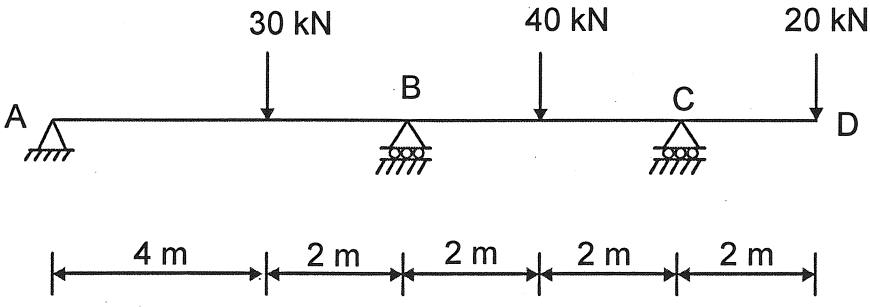
UNIT - III

7. a) State advantages & disadvantages of fixed beam. **4**

   b) Derive Claperon's theorem of three moment. **6**

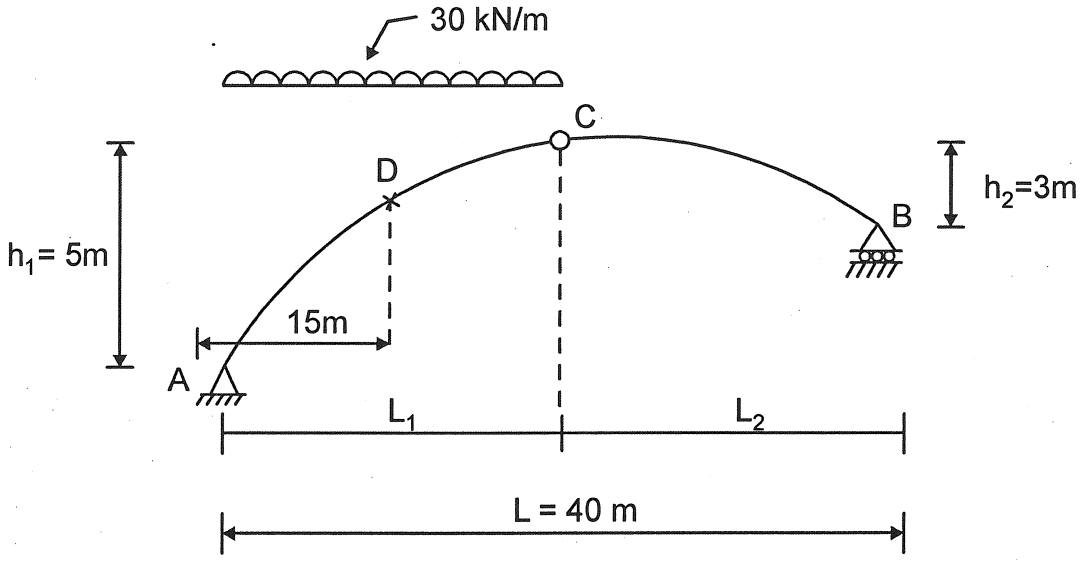
8. A fixed beam AB is fixed at A and B. The span of the beam is 10m. It is loaded with UDL of 15kN/m from 3m from left support upto 4m from right support. Find the fixed end moments. Draw SFD & BMD. **10**

9. Analyse the continuous beam ABCD shown. If support 'C' settles down by 5 mm. Take E = 15 kN/mm^2. Moment of Inertia is constant throughout & is equal to $5 \times 10^9 mm^4$. **10**



UNIT - IV

10. A three hinged parabolic arch having supports at different levels shown carries a UDL of intensity 30kN/m over the portion left of the crown. Determine horizontal thrust developed. Find also the B.M, Normal thrust & Radial shear developed at the section 15m from the left support. **10**



11. a) Explain the concept of Linear arch. **4**

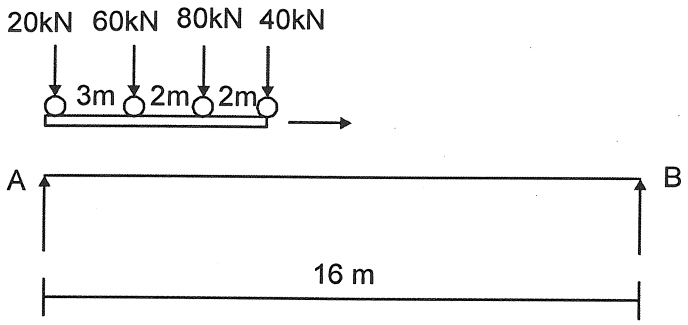
b) State and explain Eddy's theorem. **6**

12. a) A parabolic two hinged arch has a span of 32m & a rise of 8m. A UDL of 1kN/m covers 8m horizontal length of the left side of the arch. If I = Io Sec θ where θ is the inclination of the arch of the section to the horizontal and Io is the M.I. of the section at the crown. Find out the horizontal thrust at hinges & B.M. at 8 m from the left hinge. Also find out normal thrust & radial shear at this section. **10**

UNIT - V

13. Four point loads 8 kN, 15 kN, 15 kN and 10 kN have centre to centre spacing of 2m between consecutive loads and they traverse a girder of 30m span from left to right with 10kN load leading. Calculate the maximum bending moment & shear force at 8m from the left support. **10**

14. A train of concentrated loads moves from left to right on a simply supported girder of span 16m. Determine the absolute maximum shear force & absolute maximum bending moment developed in the beam. **10**



15. For the given overhanging beam, Draw ILD for the following. **10**

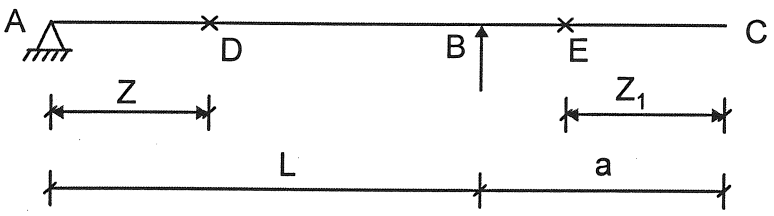
i) Reaction at support 'A'.

ii) Reaction at support ' B'.

iii) Shear force at section 'D'.

iv) Bending moment at section 'D'.

v) Bending moment at section 'E'.



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