Theory of Structure - I
(114113)

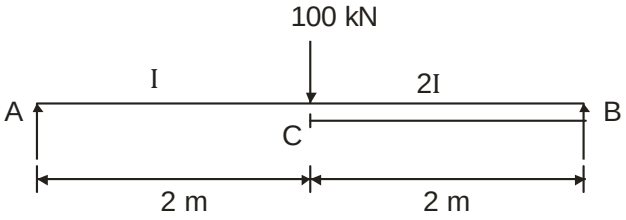
P. Pages : 4

Time : Three Hours **Max. Marks : 80**

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet 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 only two questions from each unit.
5. Use of non programmable calculator is allowed.
6. Assume suitable data if necessary.

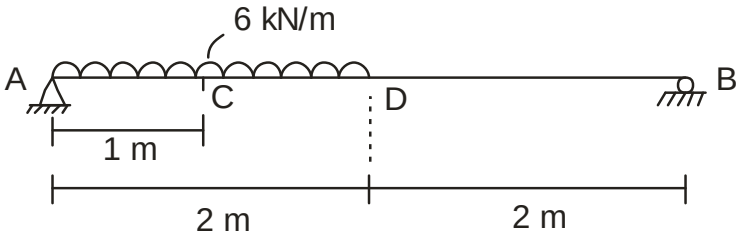
UNIT – I

1. Determine the slope at the two supports and the deflection under the load. Take $I = 24 \times 10^6 \, mm^4$; $E = 200 GPa$. Use conjugate beam method. **8**

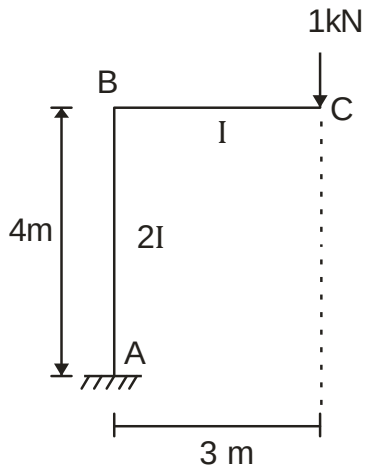


2. A beam carries an UDL of 6 kN/m as shown. By moment area method; find the deflection at C & D **8**

Take $E = 10 GPa$ and $I = 66.67 \times 10^6 \, mm^4$.

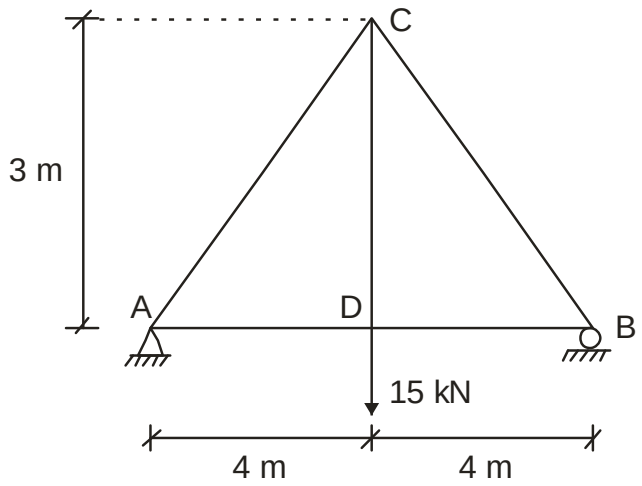


3. Determine vertical deflection of point C in the frame shown in figure. Given $E = 200 kN/mm^2$ and $I = 30 \times 10^6 mm^4$. Use strain energy method. **8**



UNIT - II

4. For the given frame shown in fig. Find the horizontal and vertical deflection of the joint 'C' using the Castigliano's theorem. AE = 10,000 kN for all the members. **8**

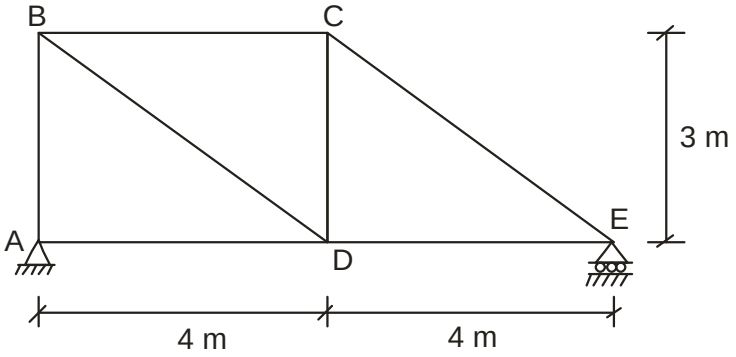


5. Explain :

a) Deflections due to lack of fit and temperature changes. **4**

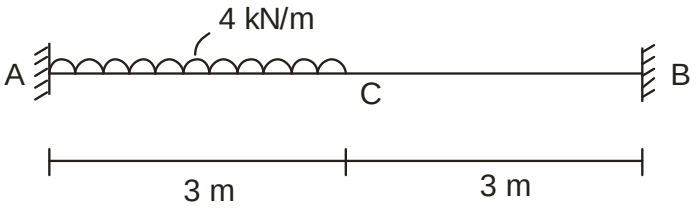
b) Effects of sinking of support in indeterminant truss. **4**

6. The member CD of the pin-jointed frame shown in figure was initially long by 6mm. Determine the stress in all members due to lack of fit of the member. The cross-sectional area of each member = 1000 mm^2 and E = 2 x 10^5 N/mm^2. **8**

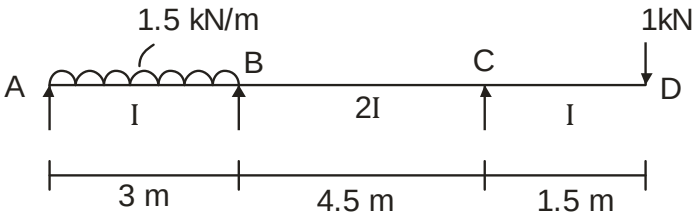


UNIT - III

7. A fixed beam AB of span 6m is carrying a UDL of 4 kN/m over left half of the span. Find the fixing moment and support reaction. **8**



8. Draw bending moment and shear force diagram for the continuous beam as shown in figure. **8**



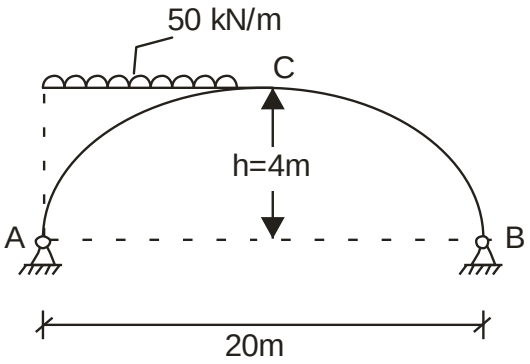
9. a) Explain advantages and disadvantages of fixed beam. **4**

b) Explain Clapeyron's theorem of three moment. **4**

UNIT - IV

10. A three hinged parabolic arch of 20m span and 4m central rise carries a point load of 150 kN at 4m horizontal distance from left support. Calculate the normal thrust and radial shear at the section under the load. Also calculate the maximum +ve and –ve bending moment. **8**

11. A two hinged arch is as shown in figure. Determine – Reactions at support and maximum bending moment. Draw B.M.D. **8**



12. a) State and explain Eddy's theorem. **4**

b) Explain the concept of theoretical arch. **4**

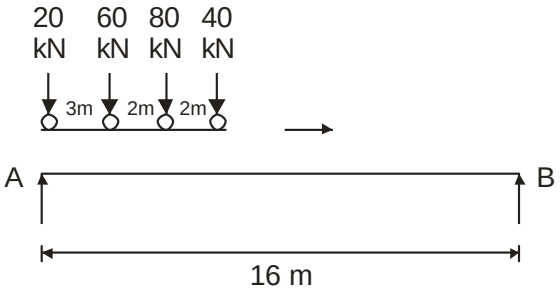
UNIT - V

13. a) What do you mean by ILD ? State its uses ? **4**

b) Explain condition for maximum B.M. at a section for wheel load. **4**

14. Draw the influence line diagram for bending moment at a point 10 m distant from left hand support on a bridge girder of span 25m as shown in figure and find the maximum bending moment at the point due to a series of wheel loads 100 kN, 200 kN, 200 kN, 200 kN, 200 kN at centre to centre distance of 4m, 2.5m, 2.5m & 2.5m. When the loads train of loads moves from right to left and 100 kN load leading. **8**

15. A train of concentrated loads shown in figure moves from left to right on a simply supported girder of span 16 m. Determine the absolute maximum shear force and bending moment developed in the beam. **8**



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