B.E. Civil Engineering (CBCS Pattern and Old) Sem-IV

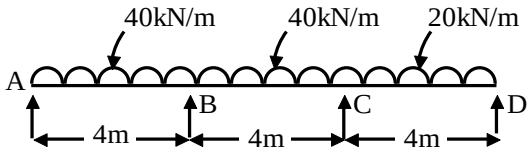
4BECE001 / CE-401 : Structural Analysis-I

P. Pages : 3 **GUG/S/19/11901**

Time : Three Hours * 3 6 9 3 * Max. Marks : 80

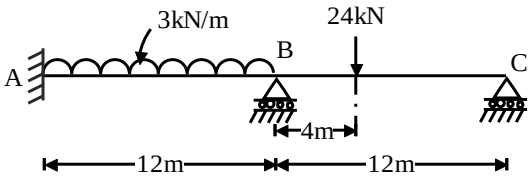
Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and Chemical equation should be given wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.

1. A continuous beam shown in fig. carrying an external loading. If the support "B" sinks by 2.50 mm below the level of the other supports, find the support moments. Take 'I' for section $I = 1.5 \times 10^8$ mm^4 & $E = 200$ kN/mm^2. Draw BMD. Use Three moment Theorem. **16**

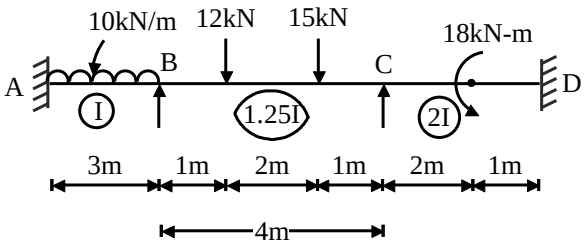


OR

2. A continuous beam is built in at A & is carried over rollers at B & C as shown in fig. It carries a uniformly distributed load of 3 kN/m over AB & a point load of 24 kN over BC, 4 m from the support B, which sinks 0.03 meter. Draw BMD. Use slope Deflection method. **16**

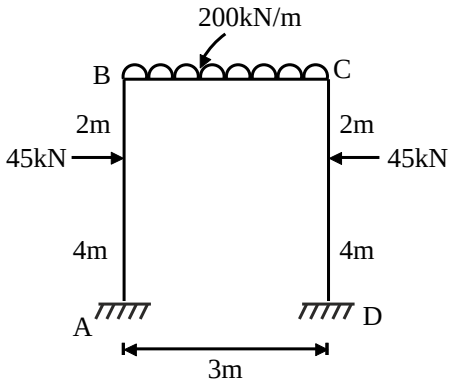


3. Analyze the continuous beam as shown in fig. by Moment distribution method. Draw BMD & SFD. **16**

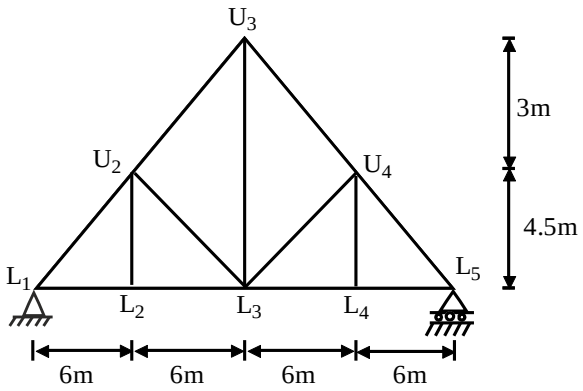


OR

4. Analyze the portal frame using moment distribution method. Draw BMD. **16**

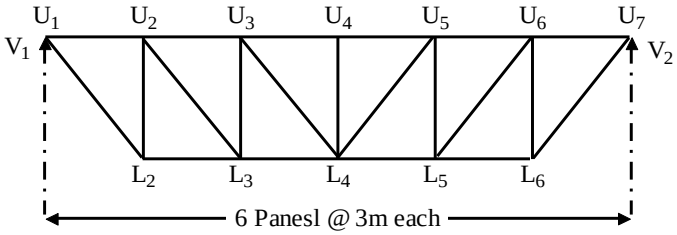


5. Draw the influence lines for forces in the members $U_2\ U_3$, $U_2\ L_3$, & $L_2\ L_3$ of the truss shown in fig. If a live load of 6.5 kN/m, longer than the span, traverses the girder, find maximum values of forces in the members mentioned above. **16**

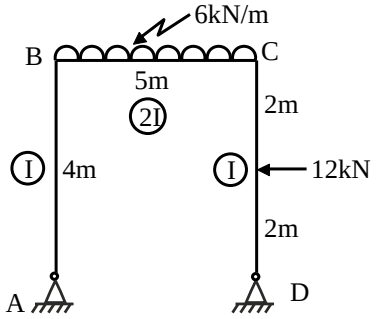


OR

6. Draw influence line diagram for force in members $(U_1, U_2), (U_1, L_2)$ & (L_2, L_3) for the truss shown in fig. **16**

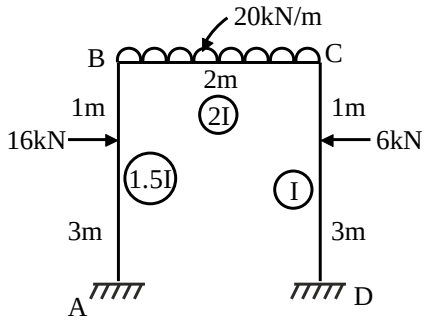


7. Analyze the portal frame as shown in Fig. by strain energy method & draw BMD. **16**



OR

8. Analyze the portal frame shown in fig. Using slope deflection method draw BMD. **16**

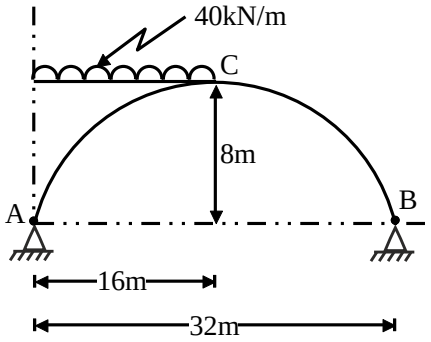


9. a) Derive expression for Euler's formula of buckling load of column of length 'ℓ' & is fixed at one end & hinged at other end. **8**

b) Derive Rankine's formula for crippling load of column & justify the statement that Rankine's formula is applicable to any length of column. **8**

OR

10. A parabolic arch hinged at its springing's, of span 32m & rise 8 m is loaded as shown in fig. Determine the values of horizontal thrust as well as maximum positive & negative BM. over the arch. Use $I = I_C \cdot Sec\theta$ with usual notations. **16**



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