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[5252]-109

S.E. (Civil) (Second Semester) EXAMINATION, 2017

STRUCTURAL ANALYSIS—I

(2012 PATTERN)

Time : Two Hours

Maximum Marks : 50

N.B. :— (i) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, and Q. 7 or Q. 8.

(ii) Neat sketches must be drawn wherever necessary.

(iii) Figures to the right indicate full marks.

(iv) Assume suitable data, if necessary.

(v) Use of electronic pocket calculator.

(vi) Use of cell phone is prohibited in the examination hall.

1. (a) Determine maximum slope and deflection for cantilever of span L loaded with uniformly distributed load w per unit length. [6]
- (b) Determine moment at B for the continuous beam loaded and supported as shown in Fig. 1 (b) by three moment theorem. Assume uniform flexural rigidity. [6]

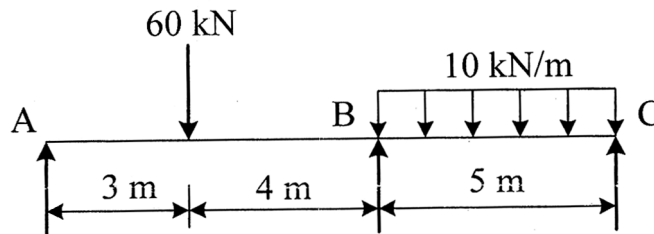


Fig. 1 (b)

P.T.O.

Or

2. (a) Determine the propped reaction for the propped cantilever loaded with uniformly distribute load w on entire span L by strain energy method. [6]
- (b) Determine the fixed moment for the fixed beam loaded and supported as shown in Fig 2 (b). [6]

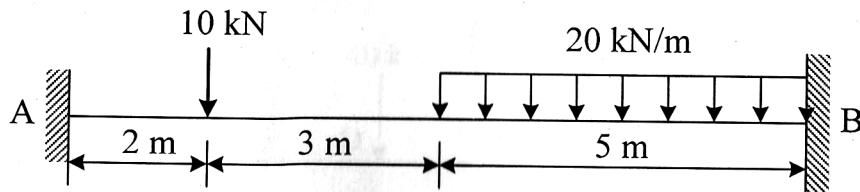


Fig. 2 (b)

3. (a) Find the vertical displacement of joint C for the pin jointed truss as shown in Fig. 3 (a). The cross-sectional area of the members AC and CB are 1500 mm^2 and the areas of the members AB is 1000 mm^2 . Take $E = 200 \text{ kN/mm}^2$. [6]

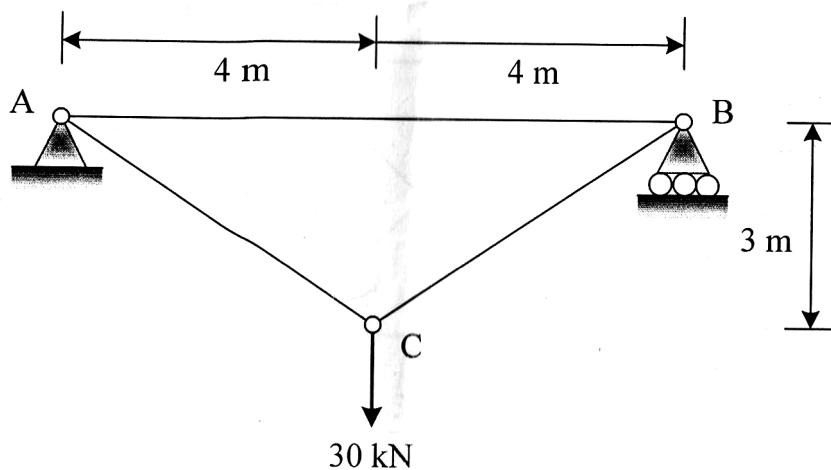


Fig. 3 (a)

- (b) Draw influence line diagrams for axial forces in the members U_2U_3 , L_2U_3 and L_2L_3 of the through type bridge truss of height 4 m as shown in Fig. 3 (b). [6]

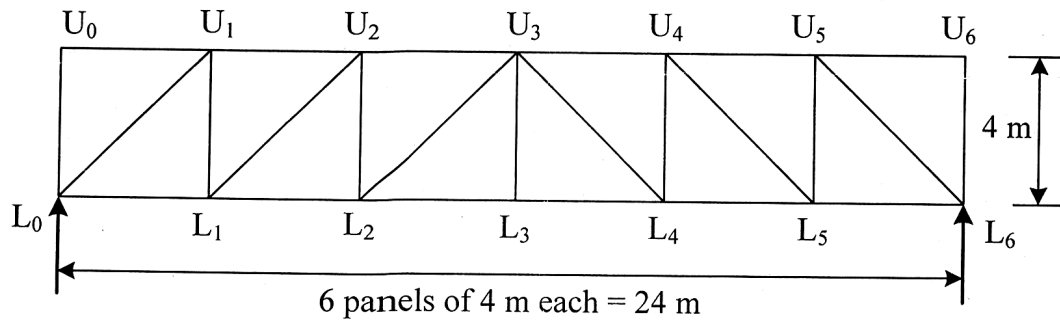


Fig. 3 (b)

Or

4. (a) A simply supported beam is loaded and supported as shown in Fig. 4 (a). Determine shear and moment at D by influence line diagram. [6]

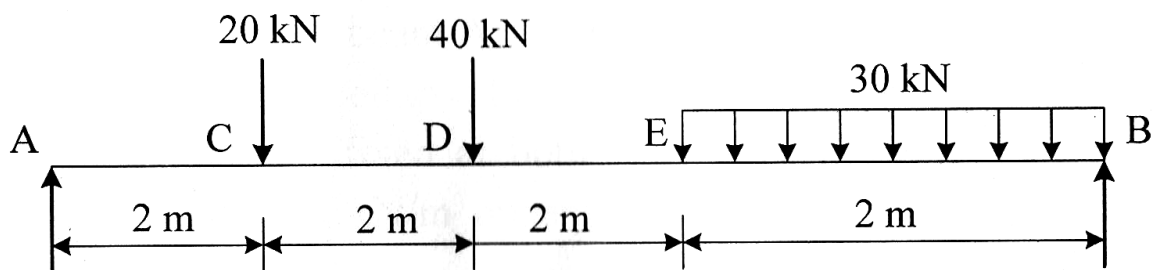


Fig. (a)

- (b) Find forces in members of the indeterminate truss as shown in Fig. 4 (b) by strain energy method. Cross-sectional area and material of all members is same.

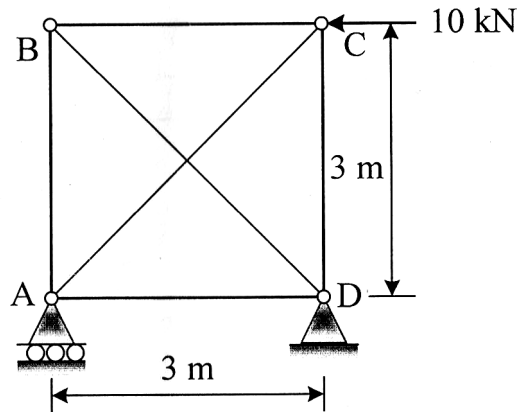


Fig. 4 (b)

5. (a) A three hinged parabolic arch of horizontal span 48 m has a central rise of 10 m. It carries a uniformly distributed load 20 kN per horizontal meter run over the middle 16 m length of the span. Calculate the radial shear force, Normal thrust at 20 m from the left support. [6]
- (b) A two-hinged parabolic arch of span L and central rise y is loaded with a concentrated load W at the crown. Determine the horizontal thrust at the support. [7]

Or

6. (a) A circular arched rib of 20 m span with central rise of 4 m is hinged at crown and springing. It carries a point load 100 kN at 5 m from the left hand hinge. Determine horizontal thrust, reaction at supports and moment under point load. [6]

- (b) A two-hinged semicircular arch of uniform section is hinged at the abutments which are at the same level. It carries a point load W at the crown. Show that the horizontal thrust at the abutment is W/π . [7]
7. (a) A simply supported beam AB of span L loaded with central point load W . Determine collapse load by static and kinematic method. [6]
- (b) A 4 m span beam fixed at both ends is loaded with uniformly distributed load 10 kN/m on entire span. Determine the plastic moment. [7]

Or

8. (a) Explain idealized stress-strain curve for mild steel in tension. [5]
- (b) Determine the collapse load for the frame shown in Fig. 8 (b) assuming uniform M_p for all members. [8]

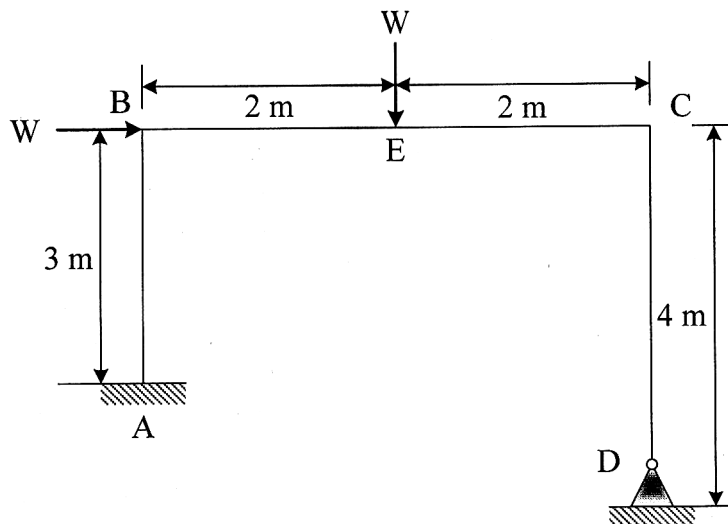


Fig. 8 (b)