Total No. of Questions—**8**] [Total No. of Printed Pages—**6**

Seat No.	

[5057]-209

S.E. (Civil) (Second Semester)

EXAMINATION, 2016

STRUCTURAL ANALYSIS—I

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer Q. No. **1** *or* Q. No. **2,** Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6,** Q. No. **7** *or* Q. No. **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 prohibit in the examination hall.

1. (*a*) State and explain static and kinematic indeterminacy. Determine the static and kinematic indeterminacy for the beam shown in Fig. 1 b. [6]

(*b*) Analyse the continuous beam loaded and supported as shown in Fig. 1 b by three moment theorem. Assume uniform flexural rigidity. [6]

P.T.O.

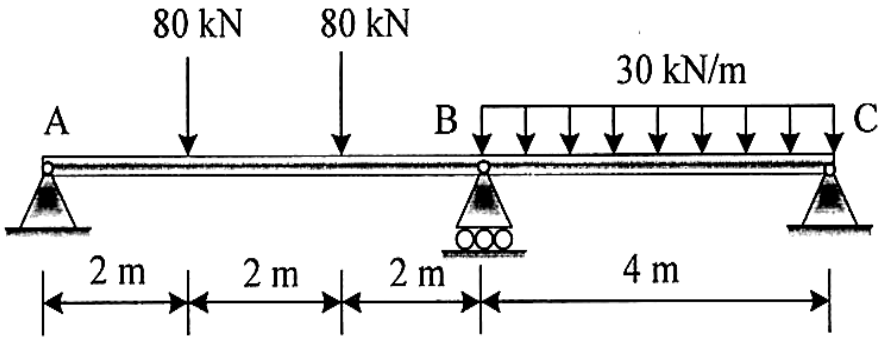


Fig. 1 b

Or

2. (*a*) Find slope and deflection for the cantilever AB of span 2 m loaded with uniformly distribution load 10 kN/m up to 1 m from end A by moment area method. Assume uniform flexural rigidity. [6]

(*b*) A portal frame ABCD has hinged ends at A and D with rigid joints B and C. The columns AB and CD are 4 m height. The beam BC is 4 m long and carries a uniformly distributed load 30 kN/m. Find the horizontal reaction at A by strain energy method. [6]

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 AD, DB and CD is 150 mm^2 and the areas of the members AC and BC are 200 mm^2 each.

Take E = 200 kN/mm^2. [6]

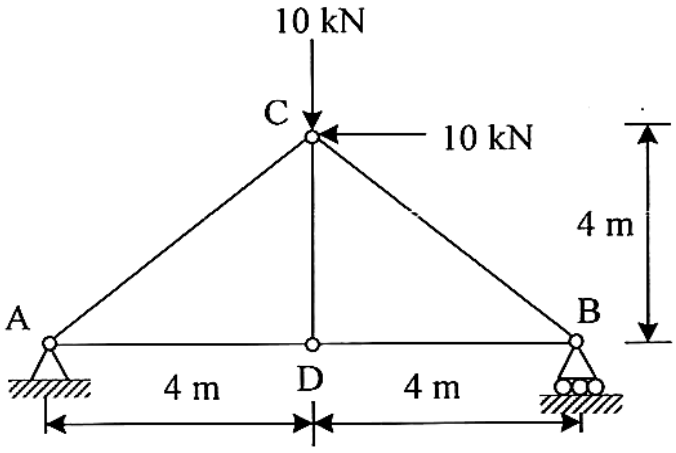
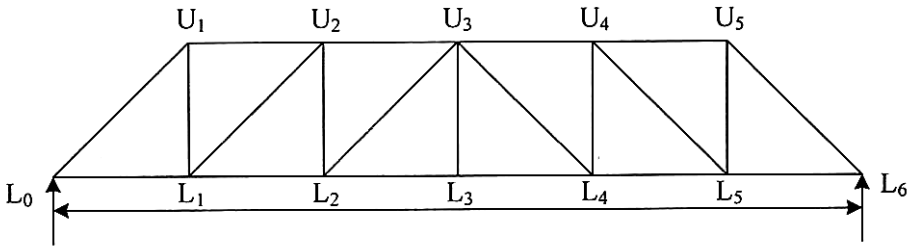


Fig. 3 a

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



6 panels of 4 m each = 24 m

Fig. 3 b

Or

4. (*a*) Determine maximum shear and moment by influence line method for a simply supported beam of span 4 m loaded with uniformly distributed load of 10 kN/m on whole span. [6]

(*b*) Two pin jointed rods AC and BC are hinged to a rigid ceiling at points A and B, 2.5 m apart. AC is 2 m long and makes a right angle to BC. If a vertical bar DC, hinged at C and to the ceiling at D is added, calculate the force in the three members when a load of 10 kN is suspended from C. All three rods have the same cross sectional area. [6]

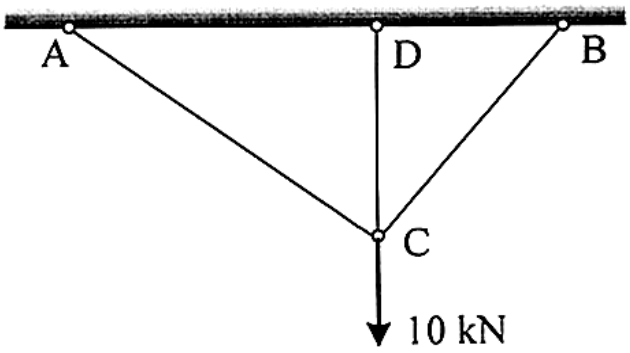


Fig. 4 b

5. (*a*) The equation of a three hinged parabolic arch with origin at its left support is $y = x - (x^2/40)$. The span of the arch is 48 m. The arch is carrying a uniformly distributed load 20 kN/m over left half of the span. Determine the horizontal reaction at the supports. [6]

(*b*) A two hinged parabolic arch of span 25 m and central rise 5 m is subjected to point load 60 kN from left support at distance of 5 m. Determine the normal and horizontal thrust. Also find bending moment under the point load. [7]

Or

6. (*a*) A circular arched rib of 20 m span with central rise of 4 m is hinged at the crown and springing. It carries a point load of 125 kN at 7.5 m from the left hand hinge. Calculate the horizontal thrust of the arch, the reactions at the supports and the maximum positive BM. [6]

(*b*) A two hinged semicircular arch of radius 10 m is subjected to uniformly distributed load 12 kN/m on the right half of the arch. Determine the horizontal thrust and reaction at supports. [7]

7. (*a*) Explain in brief equal area axis, plastic section modulus and shape factor for rectangular cross section of width b and depth d. [6]

(*b*) A beam of span L fixed at one end and hinged at other end is loaded with uniformly distributed ultimate load w_u. Find the collapse load for the beam if the plastic moment of resistance of the section is Mp. [7]

Or

8. (*a*) Explain in brief stress distribution for elastic, elasto-plastic and plastic section. [6]

(*b*) A propped cantilever beam is subjected to a concentrated load W at the centre. Determine the collapse load for the beam. [7]