Total No. of Questions—**8**] [Total No. of Printed Pages—**4+1**

Seat No.	

[4957]-1009

S.E. (Civil) (Second Semester) EXAMINATION, 2016

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**, Q. 7 *or* Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

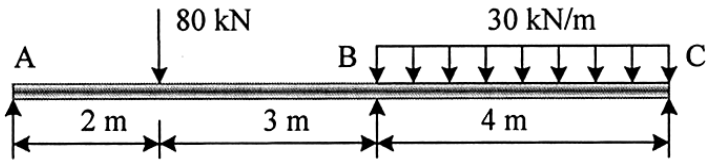
(*iv*) Assume suitable data, if necessary.

(*v*) Use of electronic pocket calculator IS : 800-2007 and steel table allowed.

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

1. (*a*) Define static and kinematic indeterminacy. Determine the static and kinematic indeterminacy of fixed and simply supported beam. [6]

(*b*) Analyse the continuous beam loaded and supported as shown in Fig. below by three moment theorem. Consider EI constant. [6]



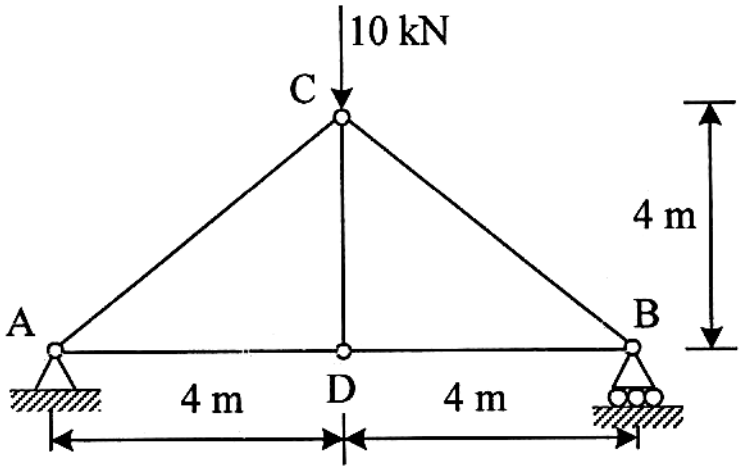
P.T.O.

Or

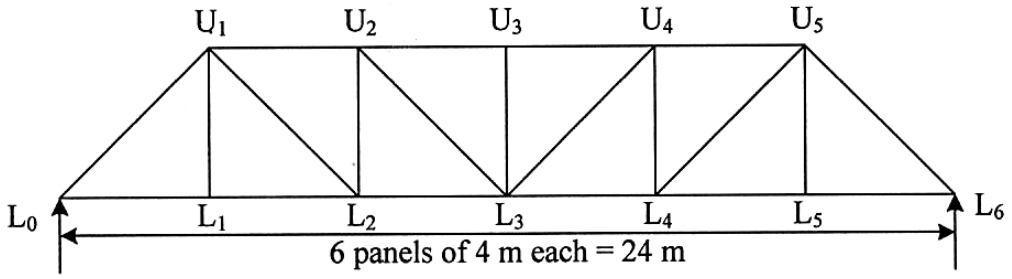
2. (*a*) Find slope and deflection for the cantilever AB of span 4 m loaded with uniformly distributed load 10 kN/m up to 2 m from fixed end A by conjugate beam method. Assume uniform flexural rigidity. [6]

(*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 D by strain energy method. [6]

3. (*a*) Find the vertical displacement of joint C for the pin jointed truss as shown in Fig. below 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]



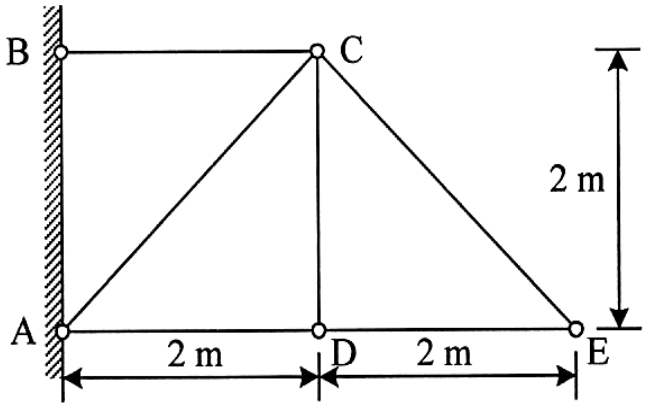
(*b*) Draw influence line diagrams for forces in the members U_1U_2, U_1L_2 and L_1L_2 of the through type bridge truss as shown in Fig. below. [6]



Or

4. (*a*) Draw the influence line diagram for support reaction, shear and moment for a simply supported beam of span L. [6]

(*b*) The pin jointed frame as shown in Fig. below. is supported on a rigid wall at A and B. All the members have same cross-sectional area of 1000 mm^2 if there is a rise of temperature of member AC by 30°C. Determine force in all members due to change in temperature. α = 0.000012, E = 204.7 KN/mm^2. [6]



5. (*a*) The equation of a three hinged parabolic arch with origin at its left support is $y = x - (x2/40)$. 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 fixed beam is loaded and supported as shown in Fig. below. Calculate the collapse load for the beam if the plastic moment of resistance of the uniform section of the beam is 30 kNm. [7]