(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2133 Roll No. | | | | | | | | | | |

B.Tech.

(SEMESTER-V) THEORY EXAMINATION, 2012-13

STRUCTURAL ANALYSIS – 2

Time : 3 Hours] *[Total Marks : 100*

Section – A

1. Attempt **all** question parts : **10 × 2 = 20**

(a) Name the three classical force methods used in the analysis of continuous beams.

(b) What are the advantages of slope-deflection method over moment distribution method ?

(c) What is meant by relative stiffness of a member ?

(d) Define Stiffness factor.

(e) State Muller Breslau's principle of influence time theorem.

(f) How will you obtain degree of static determinacy ?

(g) What is a two hinged arch ? Find out the horizontal thrust.

(h) Distinguish between flexibility method and stiffness method.

(i) Define the term yield moment and elastic bending.

(j) Define safe factor.

Section – B

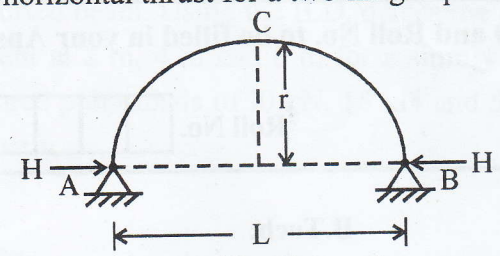
2. Attempt any **three** question parts : **10 × 3 = 30**

(a) A two hinged parabolic arch of span 20 m and rise 4m carries a uniformly distributed load of 5 t/m on the left half of span as shown in figure. The moment of inertia I of the arch section at any section at any point is given by $I = 10 \sec \theta$ where θ = inclination of the tangent at the point with the horizontal and I_0 is the moment of inertia at the crown. Find

(i) the reactions at the supports

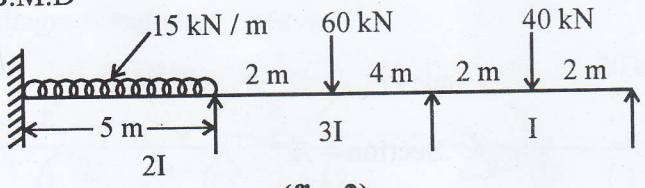
(ii) the position and value of the maximum bending moment in the arch.

(b) Draw the schematic influence time diagrams for maximum bending moment, shear force and horizontal thrust for a two-hinged parabolic arch shown in fig. 1.



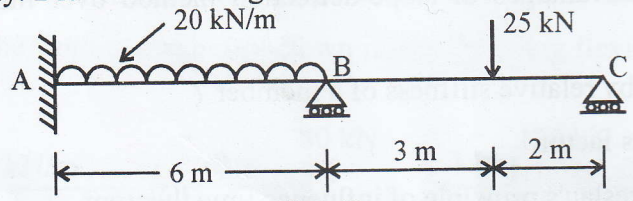
(fig. 1)

(c) Analyse the continuous beam given in figure 2. by slope deflection method and draw the B.M.D



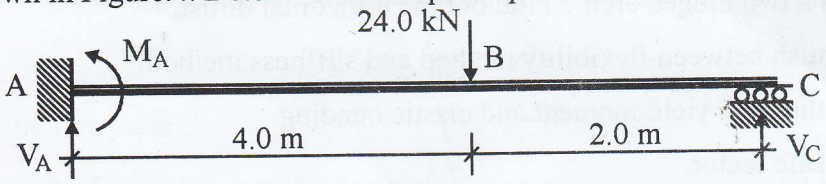
(fig. 2)

(d) Analyze the continuous beam shown in Fig.3, using flexibility method if the download settlement of supports B and C in km units are 2700/EI and 1200/EI respectively. Draw the bending moment and shear force diagrams. EI is constant.



(fig. 3)

(e) A propped cantilever is 6.0 m long and supports a collapse load of 24 kN as shown in Figure.4. Determine the required plastic moment of resistance Mp.



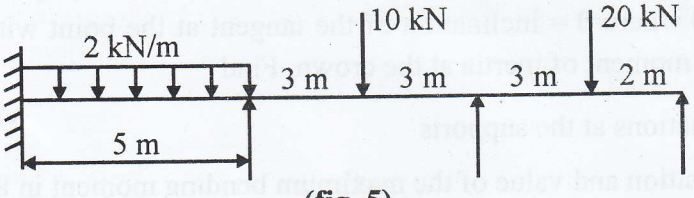
(fig. 4)

Section – C

Attempt **all** questions **10 × 5 = 50**

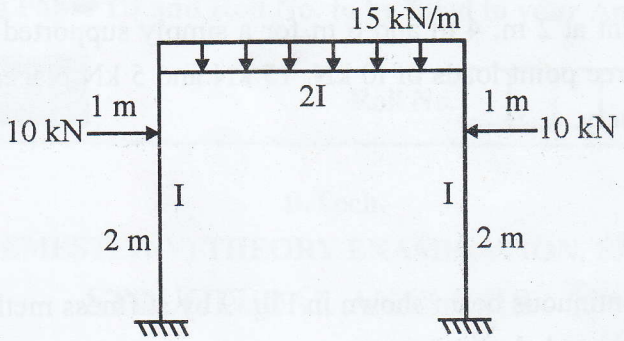
3. Attempt any **two** parts : **(5 × 2 = 10)**

(a) Draw the bending moment diagram and shear force diagram for the continuous beam shown in figure 5, below using moment distribution method. El is constant.



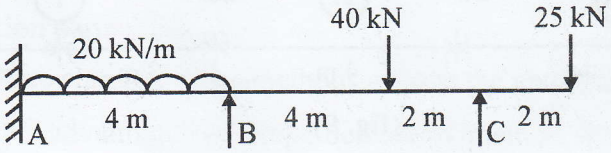
(fig. 5)

(b) Analysis the frame shown in (fig.6) below by the slope deflection method and draw the bending moment diagram.



(fig. 6)

(c) Using slope deflection method, determine slope at B and C for the beam shown in figure 7. below. EI is constant. Draw free body diagram of BC.



(fig. 7)

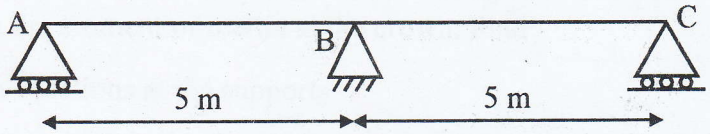
4. Attempt any **one** part : **10 × 1 = 10**

(a) The cables of a suspension bridge have a span of 40 m and a dip of 5 m. Each cable is stiffened by a girder hinged at the ends and at mid span to enable to cable to maintain its parabolic shape. A UDL of 10 kN/m over the whole span and a live load of 30 kN/m over 10 m length in central part. Determine the maximum cable tension when the head of the live load is on the central hinge. Calculate maximum S.F. and B.M. at a section 10m from the left end.

(b) Draw the schematic influence line diagrams for maximum moment, and shear force for a two-hinged stiffening girder.

5. Attempt any **one** part : **10 × 1 = 10**

(a) Determine the influence line for RA-for the continuous beam shown in the fig. 8 Compute influence line ordinates at 1 m intervals.

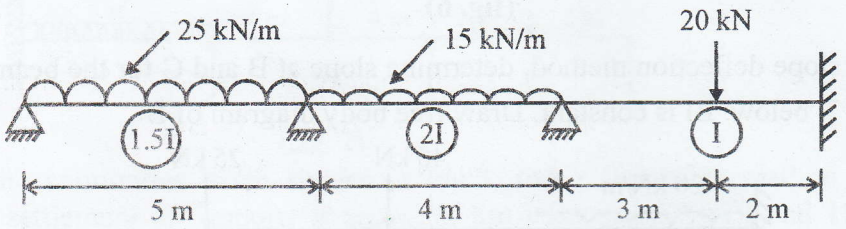


(fig. 8)

(b) Derive the influence diagram for reactions and bending moment at any section of a simply supported beam. Using the ILD, determine the support reactions and find bending moment at 2 m, 4 m and 6 m for a simply supported beam of span 8 m subjected to three point loads of 10 kN, 15 kN and 5 kN placed at 1m, 4.5 m and 6.5 m respectively.

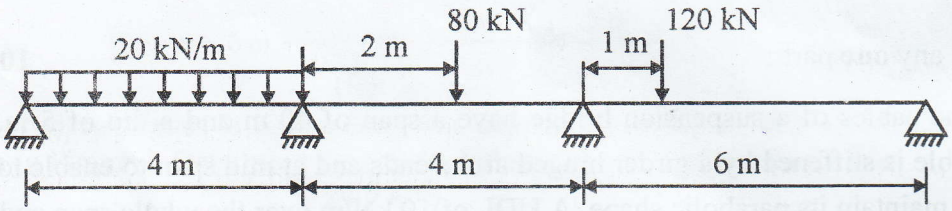
6. Attempt any **one** part : **10 × 1 = 10**

(a) Analyze the continuous beam shown in Fig. 9 by stiffness method. Draw bending moment diagram and elastic curve.



(fig. 9)

(b) Analyse the Continuous beam shown in Fig. 10 using flexibility method and draw BMD.



(fig. 10)

7. Attempt any **two** parts : **5 × 2 = 10**

(a) A beam of span 6m is to be designed for an ultimate u.d.l of 25 kN/m. The beam is simply supported at the ends. Design a suitable I section using plastic theory, assuming $\sigma y = 250\ N/mm^2$.

(b) Derive the safe factor for Rectangle, Diamond and Circular sections.

(c) Explain the methods of plastic analysis.