X. (a) State and explain the following:
(i) Rib shortening in arch bridges.
(ii) Settlement in arch bridges. (6)

(b) A three hinged parabolic arch of span 24m and a rise of 3m has its ends at same level. A point load of 20T crosses over from left to right. Calculate the +ve and -ve maximum moments at a section 6m from left and also calculate the absolute maximum values of maximum BM. (14)

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BTS (C) 058 (H)

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B.Tech. Degree IV Semester Examination November 2002

CE 403 ANALYSIS OF STRUCTURES I

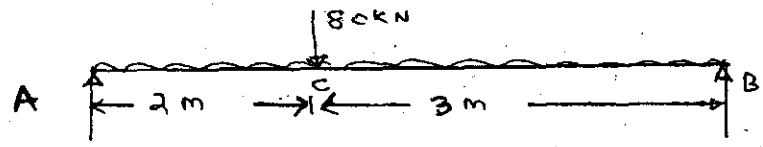
(1998 & 1999 Admissions)

Time: 3 Hours Maximum marks: 100

(All questions carry ***EQUAL*** marks)

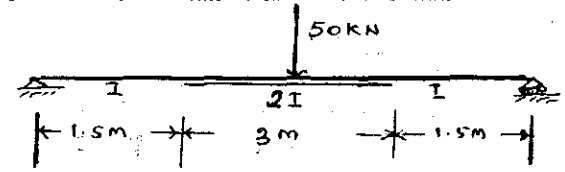
I. (a) State Castiglianos' theorem and derive the basic equation. (8)

(b) Determine the deflection under the concentrated load for a beam loaded as in figure. Take $E = 2.1 \times 10^5 N/mm^2$ and $I = 2.4 \times 10^8 mm^4$. (12)



OR

II. Find the deflection under the loads for a beam as in figure. Draw the SFD, BMD and the deflection pattern. $E = 2.1 \times 10^5 N/mm^2$ and $I = 4 \times 10^7 mm^4$. (20)



III. (a) A uniformly distributed load of length a, shorter than the span w/unit length moves over a simply supported girder of span L. Derive general equations and plot diagrams for +ve SF, -ve SF and BM. (8)

(b) A uniformly distributed load of 10kN/m covering a length of 10m crosses a girder of 40m span with hinged support at one end and roller support at the other end. Find values of maximum SF both +ve and -ve and BM at 10m from left end and also the maximum SF and BM. (12)

OR

IV. Two concentrated loads 10T an 15T spaced at 6m apart crosses a girder simply supported at ends of 20m span from left to right with 15T load leading. Construct the maximum SF and BM diagram stating the absolute maximum values. (20)

V. (a) State what do you understnad by influence lines and explain its uses in structural analysis. (6)

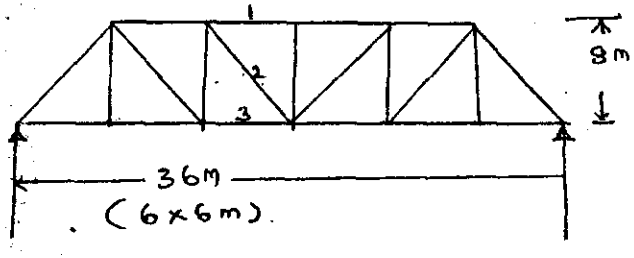
(b) A train of 4 loads consisting of 6T, 8T, 10T and 6T seperated by a distance of 2.5m each rolls over a simply supported girder of 24m span with last 6T leading. Calculate the maximum +ve and -ve SF and BM at the centre of the span. Also plot the absolute mass BM and SF. (14)

OR

VI. A truss as in figure below is loaded with 50KN/m on its bottom chord.

(i) Draw the I.L. for the forces in members 1, 2 and 3.

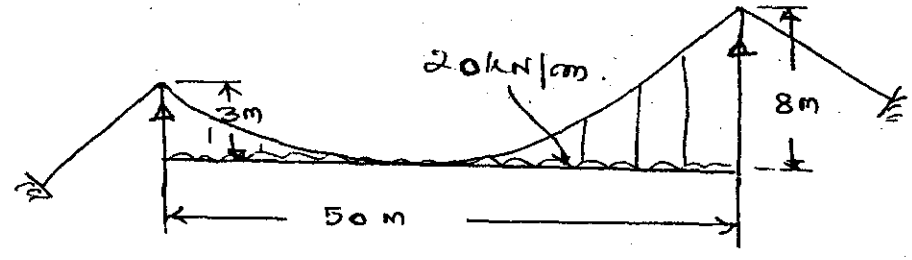
(ii) Draw the I.L. for BM in members 1, 2 and 3. (20)



VII. (a) Explain with neat sketch the various components of a suspension bridge. Derive expression for horizontal thrust on a suspension bridge when it is loaded with UDL on its left half. (8)

Contd.....3.

(b) Calculate the length of the cable of a suspension bridge as shown in figure below and calculate the maximum tension in the cable. (12)



OR

VIII. A suspension bridge 4m wide is supported on two sets of cables and loaded at the rate of 20kN/m² on its entire length. The span is 45m the supports are 2.5m and 7.5m high and the cables are drawn through smooth rollers. The cables are anchored at 30° to the horizontal. Find -

(i) Horizontal thrust.

(ii) Reactions at supports.

(iii) Max. tension in the cable.

(iv) Number of cables required on each side if the allowable stress in cable is 8T/cm² assuming suitable dia. (20)

IX. (a) State and derive Eddy's theorem and give its uses. (8)

(b) Draw the influence lines for horizontal thrust and moments giving their values at cardinal points of a three hinged arch at same level at springings when a UDL shorter than the span passes over. (12)

OR

Contd.....4.