B. Tech Degree IV Semester Examination, April 2008

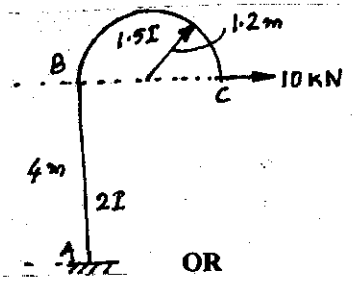
CE 403 ANALYSIS OF STRUCTURES – I

(Common for 1999 & 2002 Scheme)

Time : 3 Hours Maximum Marks : 100

I. (a) Explain Strain Energy and Complimentary Energy. (5)

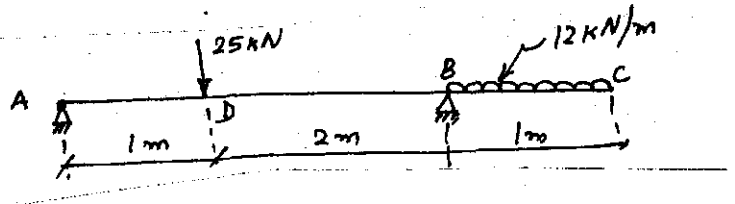
(b) Calculate the deflection at the free end of a vertical cantilever frame as shown in figure. (15)



OR

II. (a) State and prove Maxwell's Law of reciprocal deflections. (5)

(b) Determine the deflection at the free end of a overhanging beam as shown in figure. This beam has uniform flexural rigidity. (15)



III. (a) What is influence line diagram and state its importance in structural engineering. (5)

(b) Two point loads of 40 kN and 60 kN spaced 6 m apart cross a girder of 16 m span with the 40 kN load leading from left to right. Construct maximum bending moment diagram and work out absolute max-bending moment. (15)

OR

IV. (a) A system of moving loads cross a girder of 36 m span which is simply supported at its ends. Loads are 100 kN, 100 kN, 200 kN, 200 kN and 160 kN spaced at 3 m, 4.5 m, 4 m and 3.5 m respectively with 160 kN load leading from left to right. Determine –

(i) Maximum bending moment at the quarter span

(ii) Maximum bending moment in the girder. (16)

(b) What is maximum bending moment diagram and the maximum shear force diagram? Explain. (4)

V. (a) State Muller's Breslau principle and explain. (5)

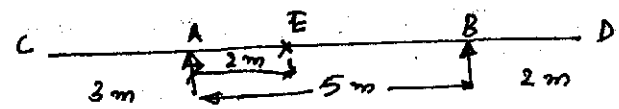
(b) Obtain influence line diagrams for

(i) Reaction at A and at B

(ii) Shear force at E

(iii) Bending moment at E

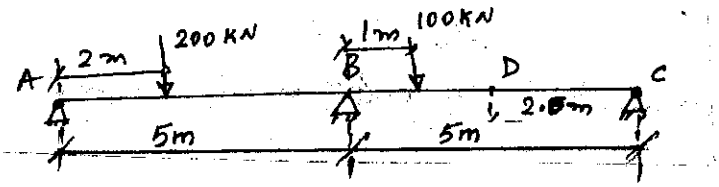
for the beam shown in Figure. (15)



(Turn Over)

OR

VI. In the Figure is shown a two-span continuous beam with the loads as shown. Draw an influence line diagram for bending moment at D. Obtain the ordinate of influence diagram at 1 m interval. Also obtain the bending moment at D for the loading position shown. (20)



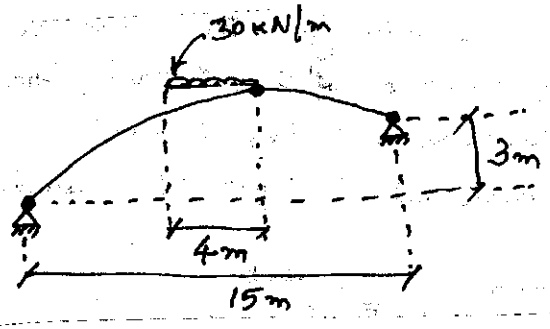
VII. (a) A cable of span 100 m has its ends at heights 8 m and 15 m above the lowest point of the cable. It carries a uniformly distributed load of 10 kN/m of the horizontal span. Determine the magnitude and the position of maximum and minimum tension in the cable. Also determine the total length of the cable. (15)

(b) Obtain an expression for the change in the horizontal thrust when the cable is subjected to change in temperature. (5)

OR

VIII. A suspension bridge of span 80 m and width 6 m is having two cables stiffened with two hinged girders. The central dip of cables is 8 m. Dead load on the bridge is 5 kN/m^2 and the live load is 10 kN/m which covers the left half of the span. Determine the shear force and bending moment at 20 m from the left end. Find also the maximum tension in the cable. (20)

IX. (a) In the Figure is shown a 3 – hinged parabolic arch having supports at different levels. Determine the maximum bending moment in the arch. Draw bending moment diagram also. (15)



(b) Differentiate between (i) three hinged arch and two hinged arch (ii) three hinged arch and fixed arch. (5)

OR

X. (a) Obtain an expression for horizontal thrust in a two hinged parabolic arch which is subjected to rise in temperature. (5)

(b) A point load w rolls over a 3 – hinged parabolic arch of horizontal span 'ℓ' and central rise 'r'. Derive the expression for maximum positive and maximum negative bending moment at any given section in the arch. Also determine the position and magnitude of maximum positive and maximum negative bending moment in the arch. (15)

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