BTS 117 (I)

B.TECH. DEGREE III SEMESTER (SUPPLEMENTARY) EXAMINATION IN CIVIL ENGINEERING (HABITAT ENGINEERING AND CONSTRUCTION MANAGEMENT) JUNE 2001

CE 303 ANALYSIS OF STRUCTURES - I

(1995 Admissions)

Time: 3 Hours Maximum Marks: 100

I. (a) A freely supported beam of span L carries a central load W. The sectional area of the beam is so adjusted that the moment of inertia of the section increases uniformly from I at the ends to 1.5 I at the middle. Calculate the central deflection. (10)

(b) Determine the vertical deflection at free end C of the beam ABC shown in Fig.1. Consider $E = 2\times10^5\ N/mm^2$ and $I = 8\times10^8\ mm^4$. (10)

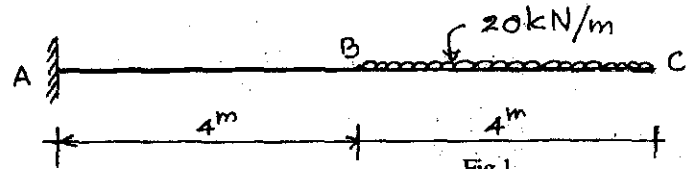

Fig.1

OR

II. A Warren girder of 12 m span (fig.2) is built up of equilateral triangles of 4m sides. It carries equal loads at the lower joints such that the tension members are stressed to 120 N/mm², while the compression members are stressed to 100 N/mm². Calculate the vertical deflection under each load, if $E = 2\times10^5\ N/mm^2$. (20)

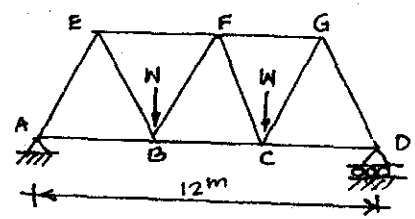

Fig.2

(Turn over)

III. (a) Discuss the condition for maximum shear in a beam supporting uniformly distributed moving load shorter than span. (4)

(b) A uniform load of 40 kN/m, 6 metres long, crosses a girder of 25 m span. Calculate the maximum shear force and bending moment

(i) at a section 10 m from left hand support, and

(ii) in the girder. (16)

OR

IV. A train of five loads 26, 60, 40, 30 and 10 kN spaced 2m apart crosses a girder of 30m span with the 26 kN load leading. Determine the maximum bending moment that can occur in the girder and the maximum shear force at the section where bending moment is maximum. (20)

V. A uniform load of 25 kN/m, 6m long, crosses a girder of 30m span. Construct the maximum shear force and bending moment diagrams, stating the position and magnitude of the greatest values. (20)

OR

VI. For the Warren truss shown in fig.3, construct the influence line for the force in members L_1L_2, U_2L_2 and U_2U_3. Using the influence line diagram, determine the maximum forces in these members due to a moving load of 10 kN/m and greater than span. (20)

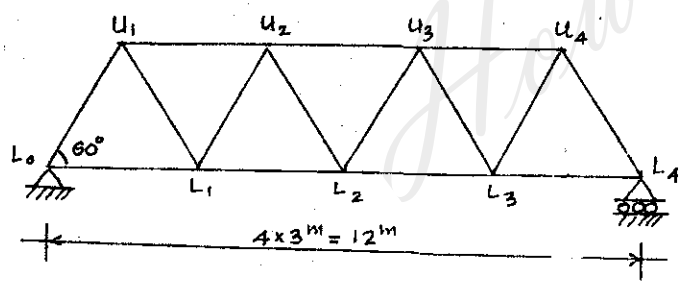

Fig.3.

Contd.....3.

VII. A suspension cable of 60m span and 6m dip is stiffened by a three hinged girder. The dead load is 7.5 kN/m. Determine the maximum bending moment anywhere in the girder when a load of 150 kN rolls from left to right. Determine the maximum tension in the cable. (20)

OR

VIII. A cable of span 150m and dip 15m carries a load of 6 kN/m run of the horizontal span. The supporting pier is 20m high and the cable is clambed to a saddle with smooth rollers resting on the top of the pier. Determine the forces and bending moment transmitted to the supporting pier. (20)

IX. A parabolic arch, hinged at the ends has a span 30m and rise 5m. A concentrated load of 12 kN acts at 10m from the left hinge. The second moment of area varies as the secant of the slope of the rib axis. Calculate the maximum bending moment anywhere on the arch. (20)

OR

X. A three hinged circular arch consists of a portion AC of radius 3 m and rise of the hinge C above A is 3m. The portion CB is of radius 8m and the horizontal distance BC is 7m. If a concentrated load of 10 kN acts at 6m from A, determine the maximum positive and negative bending moment on the arch. (20)

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