Exam.Code:0945
Sub. Code: 7103

1078
B.E. (Civil Engineering)
Third Semester
CIV-303: Structural Analysis – I

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions from each Section B-C. Any missing data can be suitably assumed clearly stating the same. Support your answer with labelled sketches wherever possible.*

x-x-x

SECTION A

1

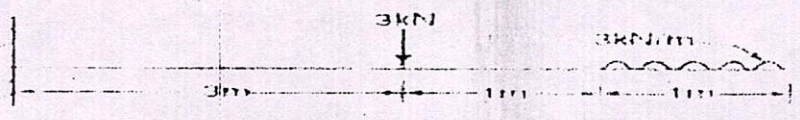
i. Define slenderness ratio.
ii. Name any four methods used for computation of deflection in structures?
iii. When a series of wheel loads move along a girder, what is the condition for getting maximum bending moment under any one point load?
iv. What is meant by absolute maximum bending moment in a beam?
v. What is meant by Imperfect frame?
vi. State limitations of Euler's theory of long columns.
vii. Briefly explain cable over saddle.
viii. Write down the expressions for radial shear and normal thrust in a three hinged parabolic arch?
ix. When is the longitudinal stress in thin cylinders 'zero'?
x. What is critical or crippling or buckling load? (1x10)

SECTION B

2. a) A thin cylinder of 110mm internal diameter and wall thickness 2mm has its ends closed by rigid plates and is then filled with water. When an external pull of 20kN is applied to the ends, the water pressure, read by the gauge, is observed to fall by 0.075 N/mm^2. Neglecting any end effects due to plates, determine the value of Poisson's ratio for the metal. Take E for the metal=2.1 X 10 N/mm^2 and bulk modulus of water=$2.17X10^3$ N/mm^2. (5)

b) A solid round bar 4 m long and 60 mm in diameter is used as a strut. Determine the Euler's crippling load under the following end conditions:
(i)Both ends are fixed and (ii) One end is fixed and the other end is hinged.
Assume the modulus of elasticity of the material of the bar as 200 kN/mm2. (5)

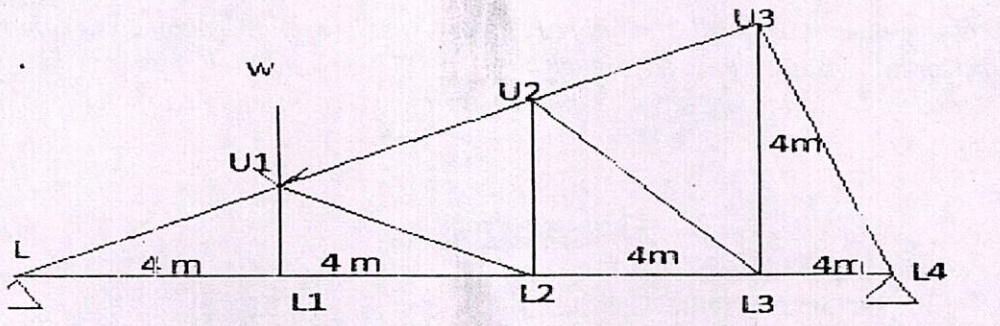
3. Find the slope and deflection at the free end of the cantilever shown in figure. Take EI = 1 x1010kN-mm^2. (10)



Fig

P.T.O.

4. Find the force and the nature of force in members U1U2, U2L2 And L2 L3 of the truss as shown in fig. (10)



SECTION C

5. Two concentrated rolling loads of 12 kN and 6 kN placed 4.5 m apart, travel along a freely supported girder of 16m span. Draw the diagrams for maximum positive shear force, maximum negative shear force and maximum bending moment. (10)

6. a) A uniformly distributed live load of length 4m and intensity 30 kN/m crosses a beam having a dead load of 10 kN/m and a simply supported span of 10m. Using influence lines, find the maximum shear force and bending moment at a section 3m from the right end. (5)

b) A masonry dam 6m high, 1.5m wide at the top 4.5m wide at the base has its water face vertical and retains water upto 5m. Calculate the maximum and minimum stress intensities at the base. The density of the masonry is 26 kN/m3 and that of water is 10kN/m3. (5)

7. a) A three hinged symmetric parabolic arch hinged at the crown and springing, has a span of 15m with a central rise of 3m. It carries a distributed load which varies uniformly form 32kN/m (horizontal span) over the left hand half of the span. Calculate the normal thrust; shear force and bending moment at 5 meters from the left end hinge. (5)

b) A suspension cable is suspended from two piers 200 m center to center one support being 5m above the other. The cable carries a uniformly distributed load of 15N/m and has its lowest point 10m below the lower support The ends of the cable are attached to saddles on rollers at top of piers. The backstays which may be assumed straight are inclined at 60° to the vertical. Determine

i. the maimum tension of the cable
ii. the tension in the back stays (5)

x-x-x