4. Describe various types of stresses developed in a thin cylinder. Derive the expression for :

(a) Stresses in a thin cylinder of length l, diameter d and thickness t subjected to an internal pressure p.

(b) Volumetric change in the cylinder if Poisson's ratio is v.

Also estimate the stresses developed in a copper cylinder of 150 mm diameter, 2 m long and 10 mm thickness when it is subjected to an internal pressure of 2.5 MN/m^2. For copper, Poisson's ratio $\mu = 0.3$ and $E = 100$ GN/m^2. **15**

Unit III

5. What do you understand by influence line diagram ? Draw influence line for shear at midpoint of penal CD and of bending moment at E, each panel is of 3 m length. Determine

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B.Tech. EXAMINATION, May 2019

(Fourth Semester)

(B. Scheme) (Main & Re-appear)

(CE)

CE202B

STRUCTURAL ANALYSIS-I

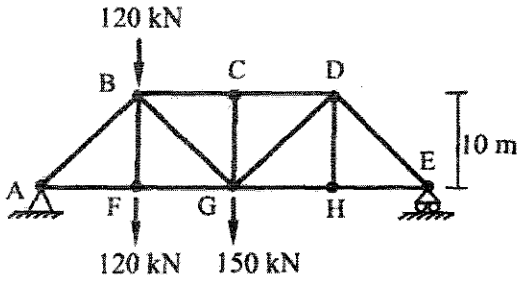
Time : 3 *Hours*] [*Maximum Marks* : 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Apply the method of virtual work to calculate the vertical deflection at joint G. Indicate the direction of deflection.



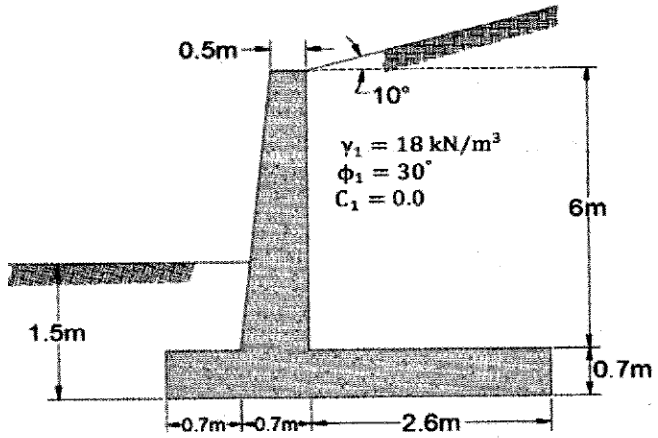
E = 200 GPa

1 GPa = 10^6 kN/m^2

A = 300 mm^2

EA is constant for all members. **15**

2. The cross-section of cantilever retaining wall shown below. Calculate the factor of safety with respect to overturning, sliding, and bearing capacity. γ_c = 24 kN/m^3.



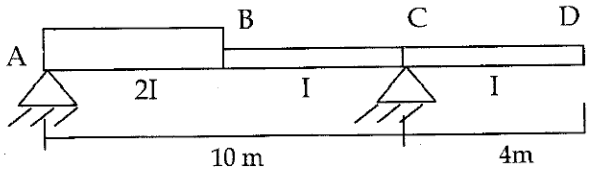
γ_2 = 19 kN/m^3

ϕ_2 = 24°

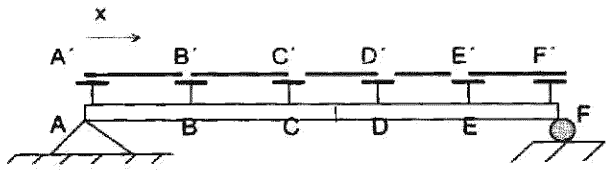
C_2 = 40 kN/m^2. **15**

Unit II

3. Find slope and deflection at point D in the beam ABCD shown in figure if the beam is subjected to a udl 10 kN/m over the whole span and a downward point load of 20 kN at B. **15**



maximum possible positive and negative at midpoint of CD due to a 2 m long udl shear of 5 kN/m. **15**



6. Draw maximum bending moment diagram for a simply support beam when it is subjected to two moving loads of 10 and 20 kN, 2 m apart. Hence find out absolute maximum bending moment in the beam. **15**

Unit IV

7. A suspension cable with 50 m span and 4 m dip is stiffened by a two hinged girder. The dead load of the girder and deck is 7.5 kN/m. Find the maximum possible SF and BM in the girder at a section 10 m from the left hand hinge if two concentrated moving loads of 100 kN and 80 kN (100 kN leading), 8 m apart cross the from the left end. **15**

8. Discuss the advantages of arches as structural member. Draw bending moment diagram of a three hinged parabolic arch of span 30 m and rise 6 m due to two point loads of 10 kN and and 20 kN acting at 10 and 20 m from left end respectively. Also find out radial shear at 12 m from left end. **15**