

4. A brass pipe has an internal diameter of 400 mm and a metal thickness of 6 mm. A single layer of high tensile wire of diameter 3 mm is wound closely round it at a tension of 500 N. Find (a) the stress in the pipe when there is no internal pressure; (b) the maximum permissible internal pressure in the pipe if the working tensile stress in the brass is 60 MN/m^2 ; (c) the stress in the steel wire under condition (b). Treat the pipe as a thin cylinder and neglect longitudinal stresses and strains. $E_s = 200 \text{ GN/m}^2$; $E_B = 100 \text{ GN/m}^2$; $\mu = 0.3$.

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Unit III

5. What do you understand by influence line diagram ? Draw influence line diagram for shear force and bending moment at C in the following beam. Find out the maximum positive and negative bending moment and shear force in the above beam at point C due to a moving train of loads 10 kN followed by

M-D-71

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B. Tech. EXAMINATION, May 2017

(Fourth Semester)

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

(CE)

CE-202-B

STRUCTURAL ANALYSIS-I

Time : 3 Hours]

[Maximum Marks : 75

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.

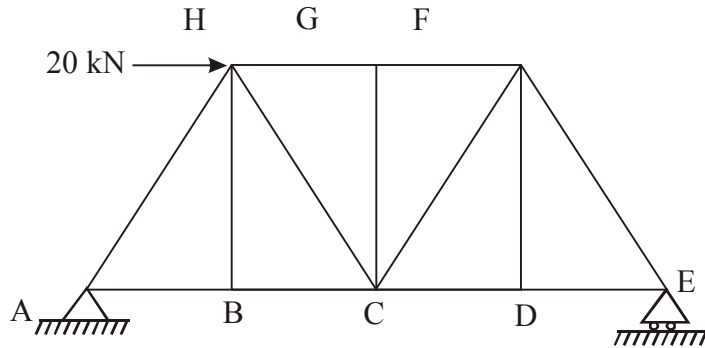
Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Assume missing data suitably.

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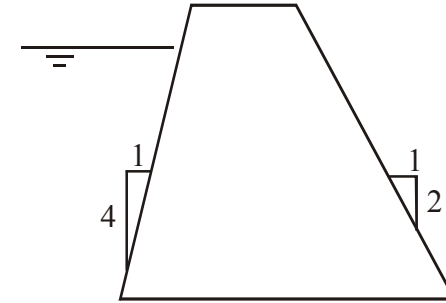
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Unit I

1. Find out horizontal deflection of roller and vertical deflection of point C in the truss given below. $AB = BC = CD = DE = DF = 4\text{m}$. Take $A = 400\text{ mm}^2$ and $E = 200\text{ GPa}$ for all tension members and $A = 300\text{ mm}^2$ and $E = 200\text{ GPa}$ for all compression members. **15**

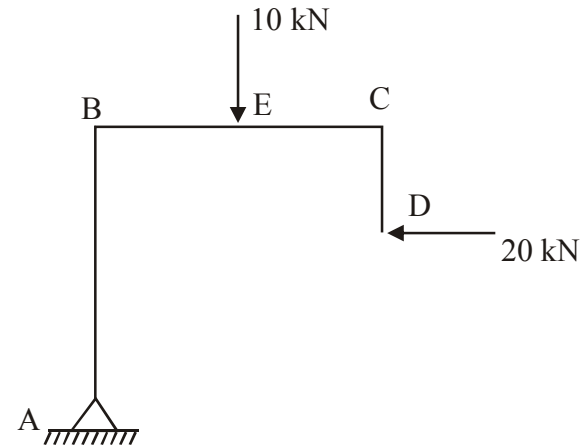


2. Derive middle third rule. A concrete dam 30 m high has top width 4m, see figure below. The water level is at 2m below the top of the dam. If unit weight of water and concrete are 10 and 25 kN/m³ respectively and coefficient of friction is 0.4, check the stability of the dam. Also find out stresses at the heel and toe of the dam. **15**



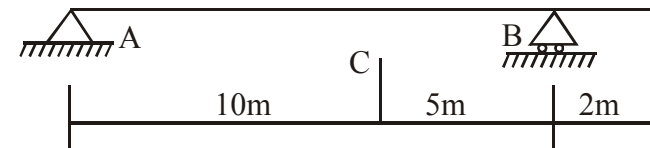
Unit II

3. State and prove Castigliano's theorem. Find slope and vertical deflection in the following frame at free end D. $AB = BC = 5\text{m}$; $CD = 2\text{m}$; E is mid-point of BC. **15**



8. A three hinged symmetric parabolic arch hinged at the crown and springing, has a span of 15m with a central rise of 3 m. It carries a uniformly distributed load of 32 kN/m over the left hand half of the span and a load of 30 kN at 10 m from left support. Calculate the normal Thrust; shear force and bending moment at 5 meters from the left end hinge. **15**

20 kN and 20 kN and at distance 2 m and 3 m apart respectively. Also find out absolute maximum bending moment in the beam. **15**



6. If a 10 kN point load moves on the through type truss shown in Q. No. 1, what will be the maximum tensile/compressive force in the members HC, BC and GH. **15**

Unit IV

7. A three hinged girder of a suspension bridge of 40 m span has a dead weight of 10 kN/m. A 5 m long live load of 8 kN/m is so placed on the girder that its head touches the central hinge. If the central dip of the cable is 5 m, find out maximum and minimum tension in the cable. Also find out the Shear force and Bending moment in the girder at a distance 12 m from the left hand support. **15**