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UH-8061

B. E. II (Sem. III) (Civil) Examination

May/June – 2012

Structural Analysis - I

(New Scheme)

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

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. II (Sem. III) (Civil)**

Name of the Subject :

☛ **Structural Analysis - I**

☛Subject Code No. : **8 0 6 1** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Figures to the right indicates full marks.

(3) Assume suitable data if necessary and mention them clearly.

1 Attempt any two. **20**

(1) A shaft has to transmit 105 kW power at 160rpm. If the shear stress is not to exceed 65 N/mm^2 & the twist in a length of 3.5m must not to exceed 1°.

Find suitbale daimeter. Take G = 8 × 10^4 N/mm^2.

(2) A thin seamless spherical shell of 1.5m dia. is 8mm thick. It is filled with a liquid, so that the internal pressure is 1.5N/mm^2. Determine the increase in diamter & capacity of the shell. Take E=2 × 10^5 MPa & 1/m=0.3

(3) A three hinged parabolic arch has a span 20m & central rise 3m. It carries a point load of 10kN at 7.5m from the left hinge. Calculate normal thrust, shear & B.M. at a section 7.5m from right end hinge. Also calculate max +ve B.M & its position. Draw B.M. diagram.

2 Derive torsional euqation. $T/J = q/R = G\theta/L$ **10**

3 Attempt any two. **20**

(1) A simply supported beam of span 4m is carrying a point load of 100kN at its mid span as shown in fig 1. Find slopes at supports & deflection at mid span. Take E=200GPa, $I = 24 \times 10^6 mm^4$.

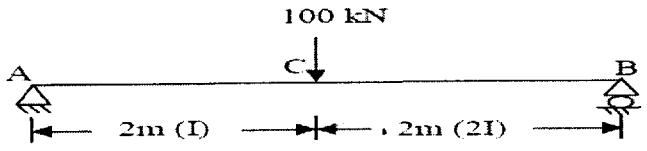


Fig 1

(2) Calcualte Φ_1 and Y_B for a cantilever beam loaded as shown in fig. 2. Take E=200 GPa & $I = 5 \times 10^8 mm^4$.

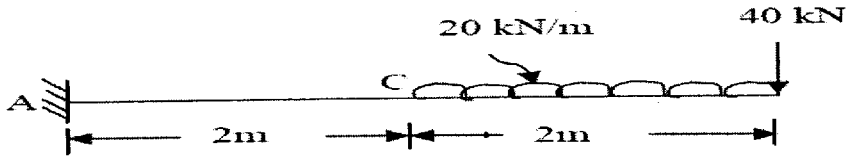


Fig 2

(3) Find the structural indeterminancy for the **Fig. 3.**

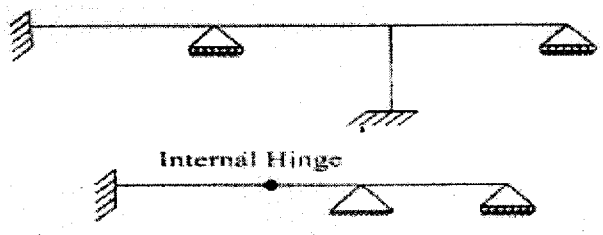


Fig. 3.

4 (a) A simply supported beam of span L is carrying UDL of W kN/m over whole span. Find strain energy stored in the beam. **6**

(b) Define influence line. How influence line diagram for BM is different from normal BM diagram. **7**

(c) Explain kernel of the section. **7**

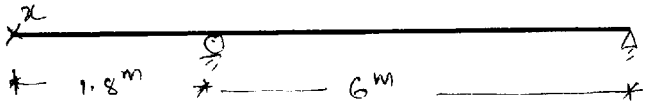
5 (a) Draw ILD for M_A, R_A and SFx for a cantilever beam having a length of 1.2m. section X-X is at 0.6m from fixed end A. **10**

(b) Derive the Eular's formula when the column having one end fixed and other end is free. **10**

OR

(a) Elaborate the limitations of Euler's formula. **10**

(b) Draw ILD for reactions and SFx and BMx for the following **Fig. 4**. **10**



6 A hollow rectangular column c/s 200 × 120 mm external dimension with 30 mm thickness. A vertical load of 75 kN acts at an eccentricity of 30 mm on diagonal. Find maximum and minimum stress induced. **10**