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RN-8061

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

May / June – 2010

Structural Analysis - I

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. - 2 (Sem. 3) (Civil)**

Name of the Subject :

☛ **Structural Analysis - 1**

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

Seat No. :

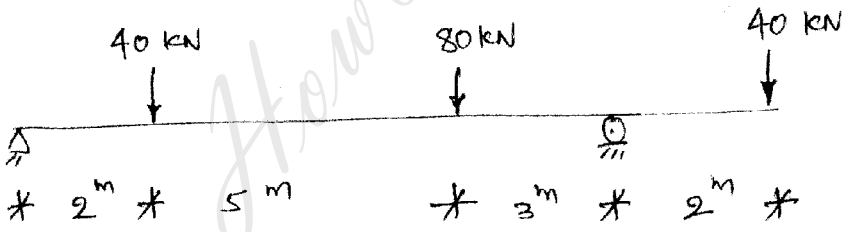
Student's Signature

(2) Assume suitable data if required.

(3) Figures to the right indicate full marks of the question.

SECTION - I

1 Calculate the slope at the supports and defraction under the loads for following figure. **18**



Use conjugate beam method only.

2 Derive the following equations with usual notations. **16**

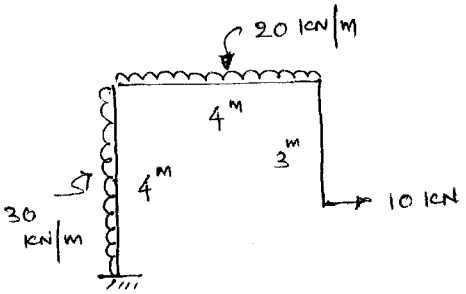
$$\frac{T}{J} = \frac{f_s}{R} = \frac{C\theta}{l}$$

and

$T = \pi/16\, f_s \cdot D^3$ for solid circular shaft

OR

2 Draw SFD and BMD for following frame. **16**



3 Define modulus of resilience, proof resilience and strain energy. Derive the equation for instantaneous deformation, when load applied with impact. **16**

OR

3 Derive the equation of defraction, for close-coiled helical spring. If the closely coiled helical spring has 20 turns wire of diameter 25 mm. The mean radius of the coils is 100 mm. Find maximum stress and elongation of the spring under the axial load of 2 kN. G = 85 GPa. **16**

SECTION - II

Q-4 (a) Construct influence line diagrams for shear force and Bending Moment for a Simply Supported Beam, at a given section 'C'. [10]

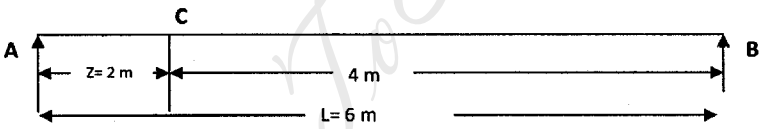


Figure 1

(b) Determine absolute maximum bending moment for beam shown in fig 3. A train of loading passes from left to right with 60 kN load leading. [10]

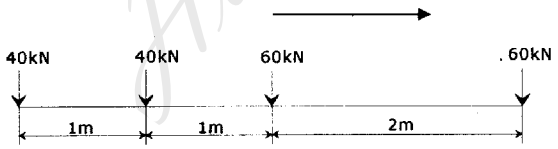


Figure 2

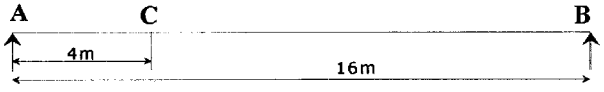


Figure 3

OR

(b) Determine the maximum forces in members L_2L_3, U_2L_2 of a truss shown in fig 4. If uniformly distributed load of 40 kN/m longer than the span traverses along the bottom chord of members. [10]

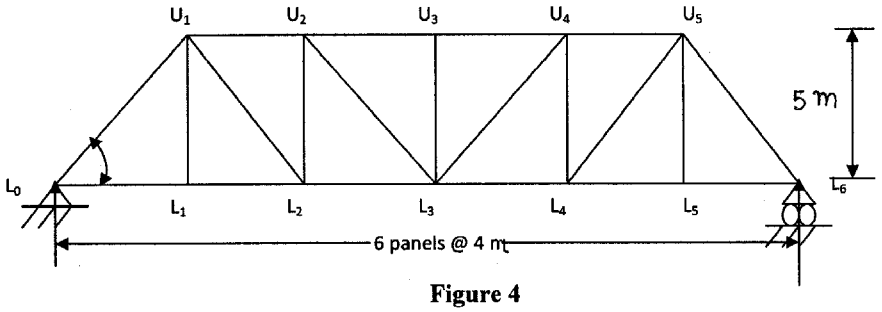


Figure 4

5 (a) Derive expression for crippling load when both the ends of the column are fixed. **7**

(b) A hollow cylindrical cast iron column is 4m long, both ends being fixed. Design the column to carry an axial load of 250 kN. Use Rankine's formula and adopt a factor of safety of 5. The internal diameter may be taken as 0.8 times the external diameter. Take f_c = 550 N/mm^2 and α = 1/1600. **7**

6 Attempt any **two** : **16**

(i) A masonry dam 4.5 m high, 1m wide at the top and 3.5 m wide at the base retains water to the full height. The water face of the dam is vertical. Determine the extreme pressure intensities at the base (i) when the dam is full (ii) when the dam is empty. Water and masonry weigh 9810 N/m^3 and 22500 N/m^3 respectively.

(ii) A parabolic three hinged arch of 30 m span is loaded with udl of 50 kN/m intensity on half of the span. The height of crown is 4m with respect to supports. Find maximum moment at a distance 10 m from left hand support.

(iii) A light cable, 18 m long is supported at two ends at the same level. The support are 16 m apart. The cable support three loads of 8, 10, and 12 N dividing the 16 m distance in four equal parts. Find the shape of the string and tension in various portions.