4E4111

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4E4111

B.Tech. IV Semester(Main/Back) Examination, June/July - 2015

Civil Engineering.

4CE1A Strength of Materials-II

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

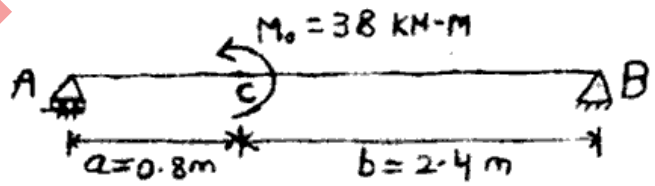
Unit - I

1. a) Write down the values of maximum slope (θ) and maximum deflection (y) for given beams and louding.

(4)

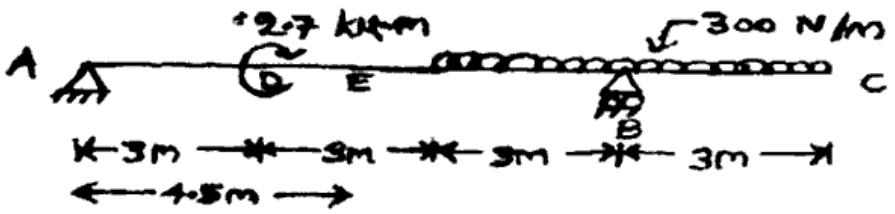
EI = constant for All beams

b) For the beam and loading shown in fig., determine the deflection at point C, use E=200 GPa, I = $4.77\times10^6 mm^4$. **(12)**



OR

1. Determine the equation of the Elastic curve for the overhanging beam and calculate deflection at centre between supports at point E.



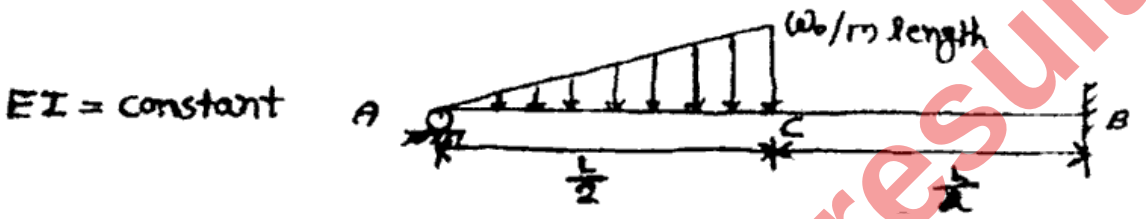
(16)

Unit - II

2. For the beam and loading shown in fig., determine

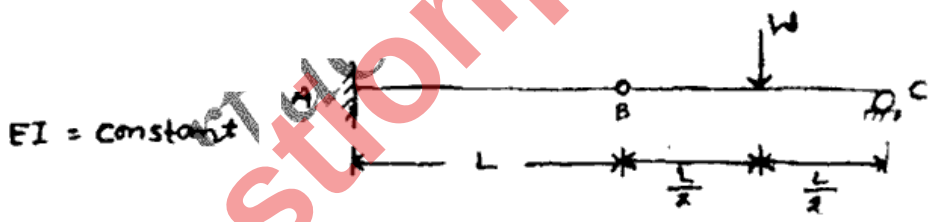
a) Reaction at Roller support A

b) The deflection at C. **(16)**



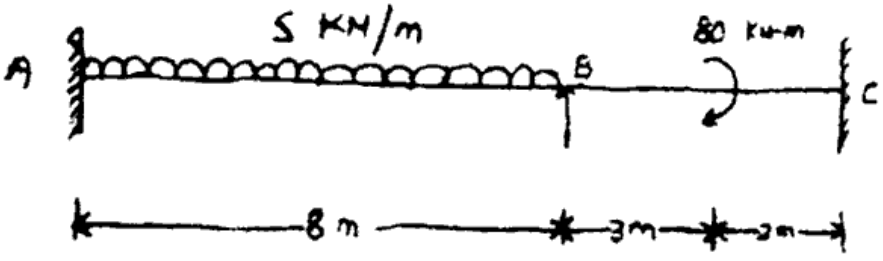
OR

2. A beam ABC is fixed at end A and has a roller support at end C. it is also provided with an internal Hinge at B. as shown in fig. Determine the slope and deflection at the Hinge B. When loaded with a point load W as shown in fig. Below. **(16)**



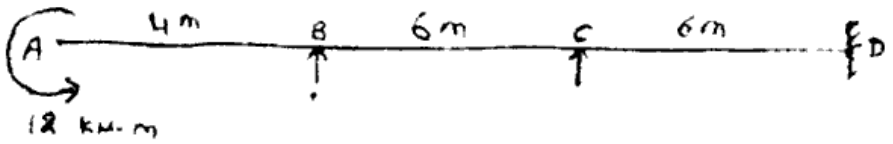
Unit - III

3. For a two span beam shown in fig. Find the support moments and reactions and plot the B.M and S.F diagrams. **(16)**



OR

3. Determine the Reaction at the supports B and C for the propped cantilever beam shown below. **(16)**



Unit - IV

4. a) Write down the Assumptions used in developing the equations for stresses and deformation in a bar subjected to pure Torsion. **(6)**

   b) A solid shaft of Aluminium of length 1.5m and of 60mm diameter is to be replaced by a tubular steel shaft of the same length and the same outside diameter, such that each of two shafts have the same angle of twists per unit torsional moments over the total length. Determine the inner diameter of the tubular steel shaft, if the modulus of rigidity of steel is three times that of Aluminium. **(10)**

OR

4. a) At a certain cross-section, a shaft of 80 mm diameter is subjected to
   i) A bending moment of 6 kμ-m and
   ii) A twisting moment of 9 kμ-m. Compute the maximum direct stress induced in the section, indicating the position of the plane on which it acts. **(8)**

   b) A Load P is supported by two steel springs arranged in series as shown in fig. The upper spring has 20 turns of 20 mm diameter wire on a mean dia of 150 mm. The Lower spring consists of 15 turns of 10mm diameter wire on a mean diameter of 130 mm. Determine the maximum shearing stress in each spring, if the total deflection is 80mm and G=83GPa. **(8)**

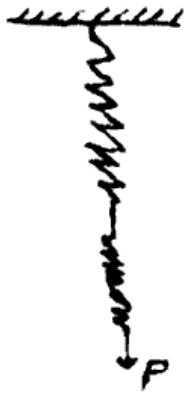


fig. for Q.4(b)

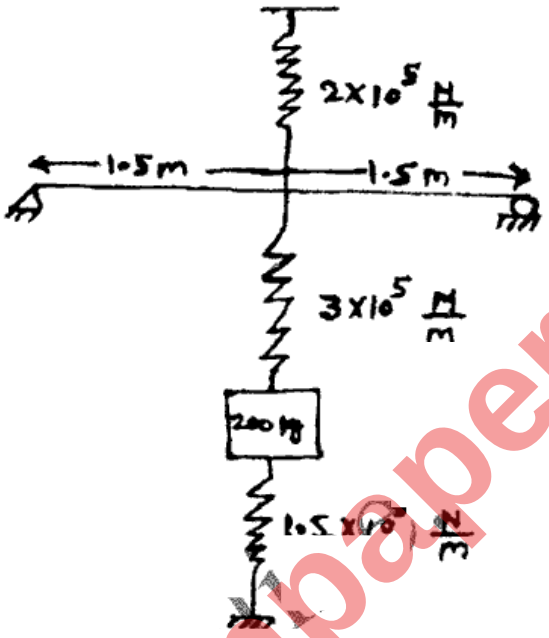
Unit - V

5. a) Derive an equation which gives the relationship between natural frequncy and the static deflection of the system. **(8)**

   b) Find the natural frequency of the 200 kg block in fig.

   for beam given $E = 210 \times 10^9 \frac{\mu}{m^2}$

   $I = 1 \times 10^{-6}\ m^4$ **(8)**



OR

5. Write short notes on the following:
   a) Under, over and critical damping.
   b) Types of vibration.
   c) Rayleigh's method to derive the equation of motion of a vibratory system.
   d) Vibration control in the design of structures. **(4×4=16)**