CE (8)

4E4111

Roll No. _____ Total No. of Pages : 7

4E4111

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017

Civil Engg.

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.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 Consider the simply supported beam subjected to the two end couples M_1 and M_2 as shown in fig.-1 below, determine the equation of the deflection curve and locate the point of peak deflection if $M_1 = 0$.

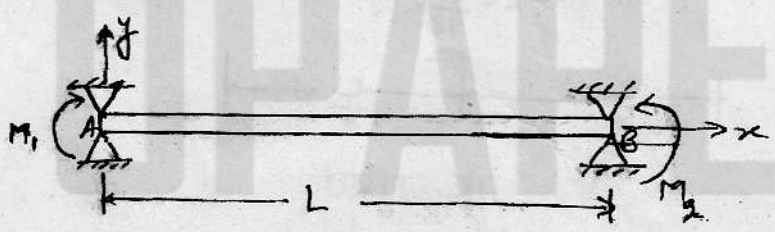

Fig. 1

16

OR

1 The beam AD in fig. 2 below is simply supported at A and C, loaded by a uniform load from B to D, and also by a couple M_o applied at D, as shown in Fig. 2. Determine the equation of the deflection curve through the use of singularity functions.

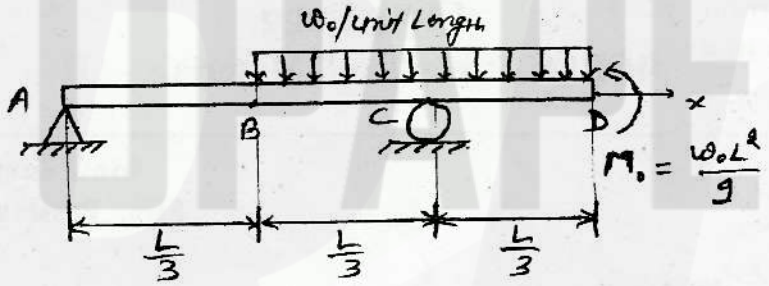

Fig. 2

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UNIT - II

2 The beam of flexural rigidity EI in fig. 3 below is clamped at end A, supported at C, and loaded by the couple at B, together with the load uniformly distributed over the region BC. Determine all reactions and draw B.M.D.

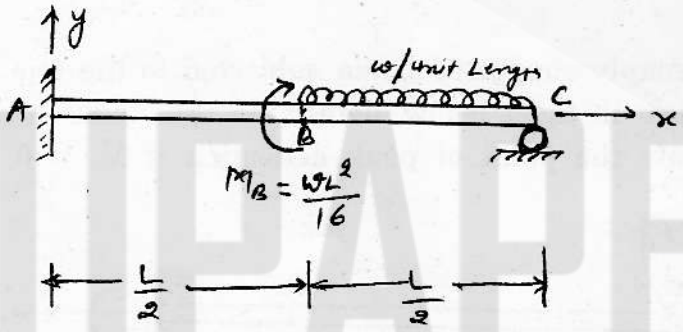


Fig. 3

16

OR

2 (a) Explain 'Middle Third Rule' and 'Middle Fourth Rule'. 8

(b) A short hollow cylindrical column shown in figure 4 below is acted by a load of 10 kN inclined at 30° to the column axis. Calculate the maximum tensile and compressive stresses set up in the base AB of the column.

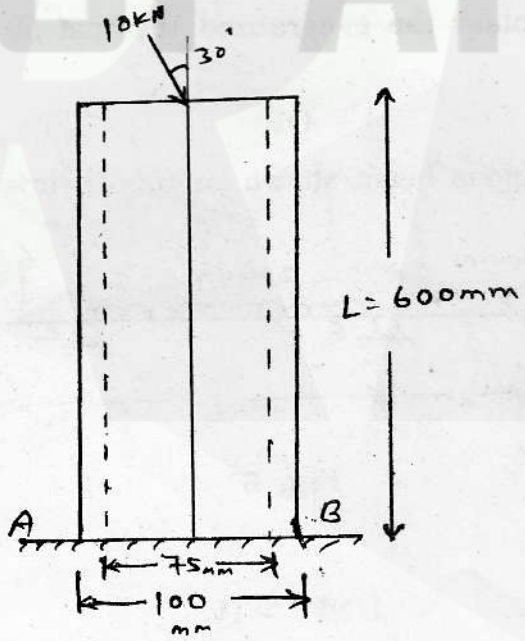


Fig. 4 8

UNIT - III

3 (a) Determine the support moments for the beam and loading shown in fig. 5 below. Also draw S.F.D. and B.M.D.

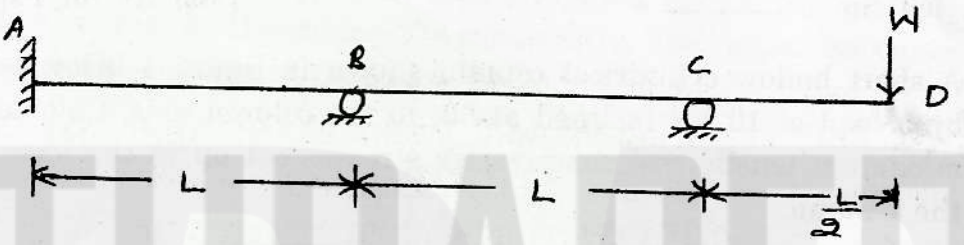


Fig. 5

(b) Write and explain the generalized theorem of three moments. 12

4

OR

3 Analyze the continuous beam shown in fig-6 below.

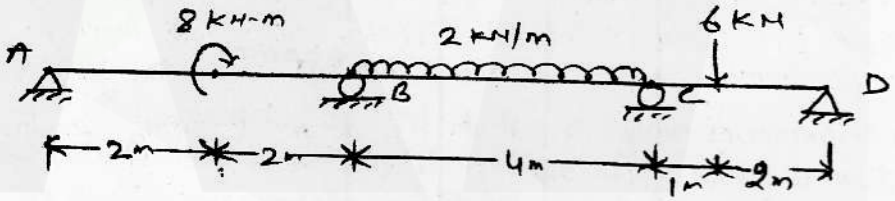


Fig. 6

16

UNIT - IV

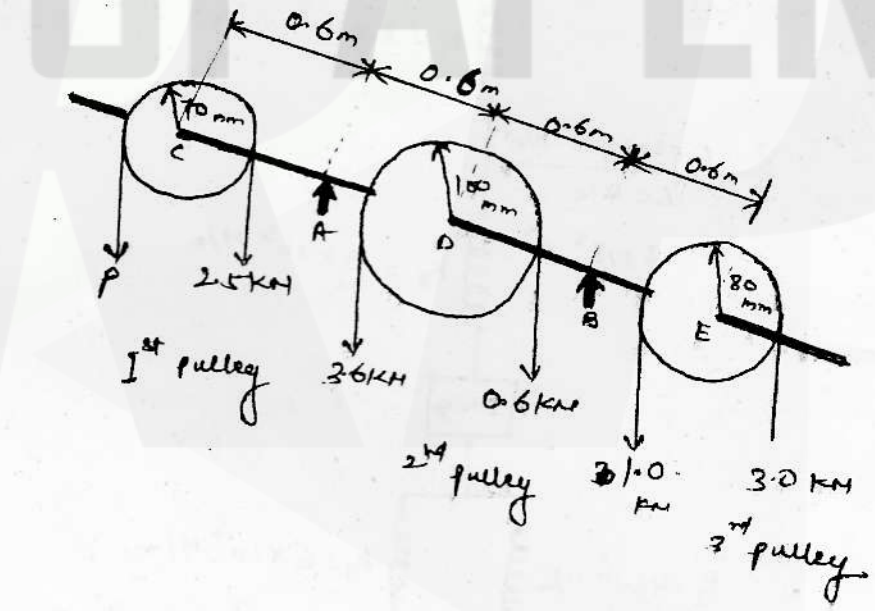
4 (a) A closed-coiled helical spring is to have a stiffness of 900 N/m in compression with a maximum load of 45 N and a maximum shearing stress of 120 N/mm^2. The "solid" length of the spring (i.e. coil touching) is 45 mm. Find the wire diameter, mean coil radius and number of coils. Take N = 40000 N/mm^2. 8

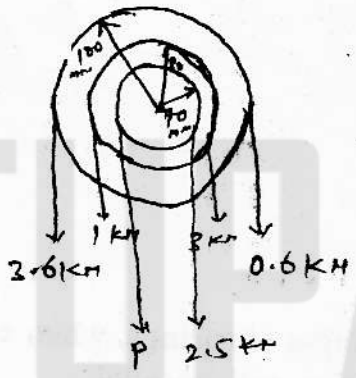
(b) Derive expression for the axial movement of closed coiled helical spring under axial pull P. 8

OR

4 (a) Write a short note on Power Transmitted by Shafts. 4

(b) A solid circular shaft of constant cross-section carries three pulleys as shown in fig. 7 below and is supported in Bearing at A and B. Calculate an unknown tension P on the belt of the first pulley. The pulley belts are all vertical. Also determine reactions at supports and draw S.F. and torque diagrams.





End view

Fig. 7

12

UNIT - V

5 (a) Determine the natural frequency of the system shown in fig. 8 below. Also find natural period.

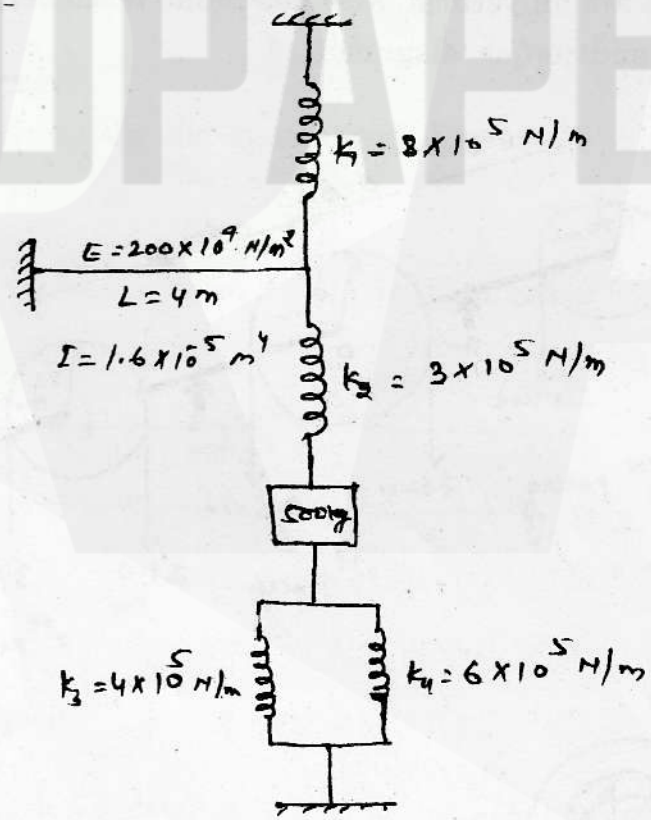


Fig. 8

12

(b) Find expressions for equivalent stiffness of springs, when two springs of stiffnesses K_1 and K_2 are in series and parallel.

4

OR

5 A mass of one kg is suspended by a spering having a stiffness of 600 N/m. The mass is displaced downward from its equilibrium position by a distance of 0.01 m. Find

(a) Equation of motion of the system

(b) Natural frequency of the system

(c) The Response of the system as a function of time

(d) Total Energy of the system. **16**