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C16–C–302

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BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—2018

DCE—THIRD SEMESTER EXAMINATION

STRENGTH OF MATERIALS

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point.

1. Write the relationship among the rate of loading, shear force and bending moment.

2. Define 'point of contraflexure'.

3. State any three assumptions made in theory of simple bending.

4. Draw the shear stress distribution across *(a)* hollow circular section, *(b)* I-section and *(c)* T-section.

5. Distinguish between strength and stiffness of a beam.

6. Calculate the slope and deflection at the free end of a cantilever beam 5 m long, carrying a u.d.l. of 15 kN/m over entire span. Use Mohr's theorems, take *EI* 8400 kN-m^2.

7. Define *(a)* elastic curve and *(b)* draw elastic curve for a single overhanging beam.

8. Distinguish between long and short columns.

9. State the formula for strains of a thin cylinder.

10. Define the term 'polar modulus' and write SI units.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

11. Draw shear force and bending moment diagrams for the cantilever shown in Fig. 1 :

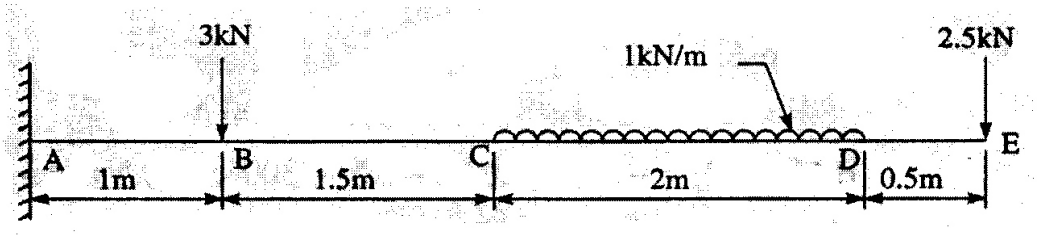

Fig. 1

12. Calculate the reactions for the beam shown in Fig. 2. Construct the bending moment and shear force diagrams. Determine the location of the maximum bending moment and mark it clearly on the bending moment diagram.

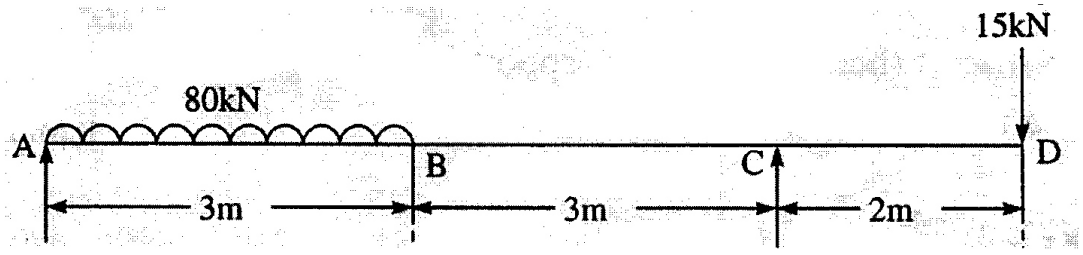

Fig. 2

13. Derive the 'simple bending equation' with usual notations.

14. Two beams particulars of which are given below, are simply supported at the ends over equal spans and carry central loads to produce the same maximum bending stress in each beam. Determine the ratio of the maximum shearing stress as in the webs of the beams.

Section	*Thickness of web* mm	*Thickness of flange* mm	*Width of flange* mm	*Total depth* mm	*Distance of NA from outer edge of flange* mm
I	4·8	8·4	60	120	60
T	12	12	120	96	25·2

15. For the simply supported beam shown in Fig. 3, find *(a)* slope at each end, *(b)* deflections at *C* and *D* and *(c)* maximum deflection.

Take E 200 kN/mm^2 and I 6 50 10^8 mm^4. Use Macaulay's method.

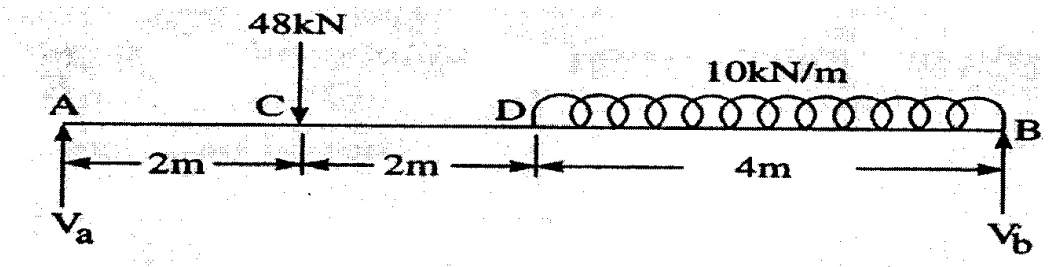

Fig. 3

16. A beam 8 meters long is simply supported at its ends, carries a load 40 kN at a distance of 2 metres from one end and another load of 40 kN at a distance of 2 metres from the other end. Determine the slopes at ends and deflection at the centre of the beam, using moment area method. *EI* for the beam = 50000 kN-m^2.

17. A cast iron column of hollow circular section 5 m long with ends firmly built in has to carry an axial load of 300 kN. Determine the section using a factor of safety 8. Internal diameter to be 0·75 times the external diameter. Take f_c 550 N/mm^2 and a $\frac{1}{1600}$.

18. A short column of hollow square section as shown in Fig. 4 is acted upon by a vertical compressive load with an eccentricity 50 mm. Find the maximum load, the column can carry if the maximum stress in compression and tension are limited to 60 N/mm^2 and 3 N/mm^2 respectively.

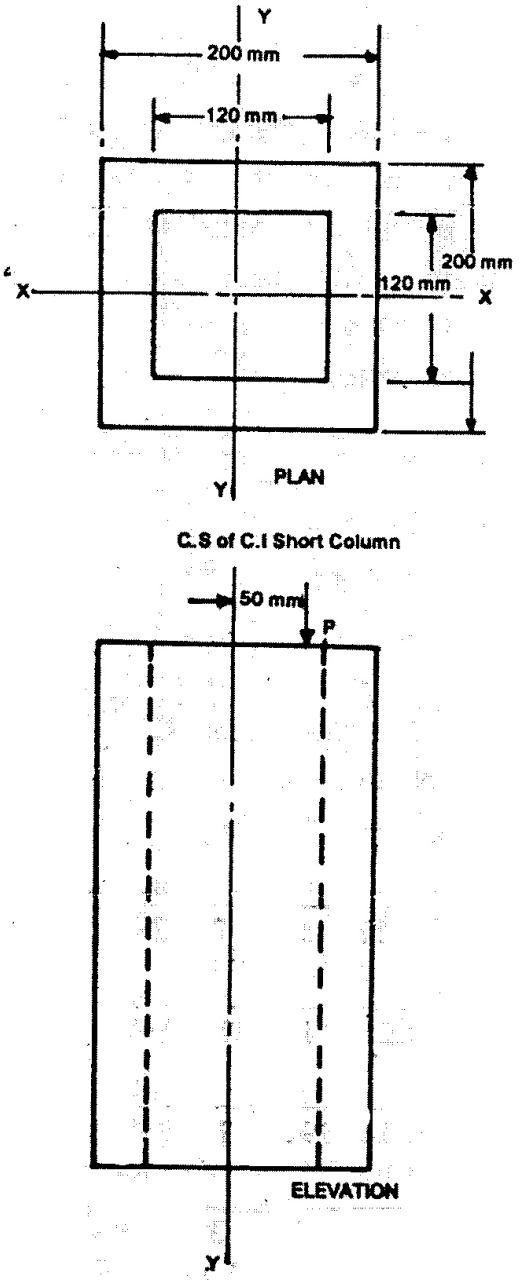

Fig. 4

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