

E-1134

B. E. IIIrd Semester (Main & Re) Examination - December, 2019

STRENGTH OF MATERIAL

Branch : (CE)

Code : ESC-301

Time : Three Hours]

[Maximum Marks : 60

Note : Attempt *all* questions from Section-A (objective types questions) and *all* questions from Section-B (short answer type questions) and *three* questions from Section-C (long/essay type questions).

SECTION – A

1 × 10 = 10

(Objective Type Questions)

1. (a) How the thick & thin cylinder classified ?
(b) The ability of a material to resist deformation is said to be :
(i) strength (ii) toughness
(iii) plasticity (iv) brittleness
(c) What is shear force & bending moment diagram ?
(d) The ratio of Young's modulus to the bulk modulus is :
(i) More than one third (ii) Less than one third
(iii) Less than one half (iv) None of the above
(e) The bending moment diagram for a cantilever beam subjected to bending moment at free end will be :
(i) A triangle (ii) A rectangle
(iii) A parabola (iv) A cubic parabola
(f) What is bending & direct stress ?

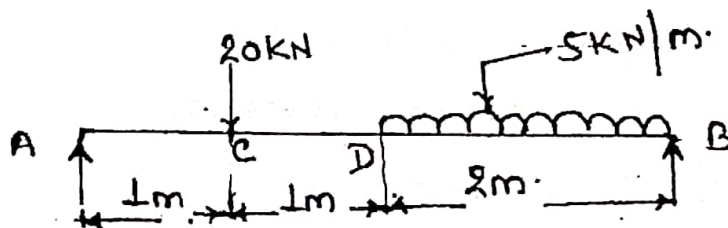
P. T. O.

- (g) What is passion ratio ?
- (h) The strain energy stored in a material is also known as
- (i) What is struts & column, also write effective length for one end hinged & another end fixed ?
- (j) B. M. is max where S. F. is

SECTION - B

 $5 \times 4 = 20$

1. A beam of AB of length 4 m span is simply supported at the ends and is loaded as shown in fig.



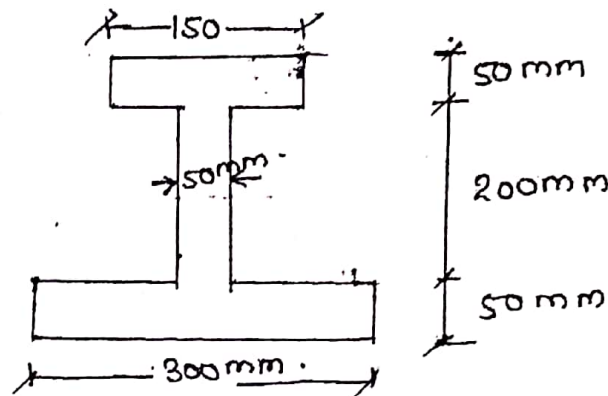
Find deflection at C, slope at A. when $E = 200 \times 10^6 \text{ kN/m}^2$, $I = 20 \times 10^6 \text{ m}^4$

2. What do you understand by middle third & middle quarter rule ?
3. A laminated steel spring 1m long is to support centre load 5.8kN. If the max deflection of spring is not exceeding 45mm & maximum stress should not exceed 300 MN/m^2 . Calculate :
 - (a) the thickness of leaves
 - (b) their number if each plate is to be 80mm wide take $E = 200 \text{ GN/m}^2$.
4. A thick-walled closed cylinder is made of Al-alloy ($E = 72 \text{ GPa}$, $\nu = 0.33$) has inside diameter of 800 mm the cylinder is subjected to internal fluid pressure of 150 Mpa determine the hoop stress & max shear stress at a point on the inside surface of the cylinder ?

SECTION - C

 $10 \times 3 = 30$

1. Drive the Euler's formula when both end of the column is fixed & also writing the effective length.
2. A beam simple supported at ends & having X-section as shown below is loaded udl over entire span. If the beam is 8m long find the udl if the max permissible bending stress in tension is limited to 30 MN/m^2 & in compression to 40 MN/m^2 . What is the actual max permissible stress set up in the section?



3. Explain & find the shear centre for C-section.
4. A tie rod of uniform circular x-section is required to withstand a max tension of 500 KN, but the end fixing is such that the line of action off the axis of the member by 7.5 mm. find the minimum diameter of the tie rod if the max allowable stress is 125 KN/mm^2 .