

ANNA UNIVERSITY OF TECHNOLOGY, COIMBATORE
B.E. / B.TECH. DEGREE EXAMINATIONS : NOV / DEC 2011

REGULATIONS : 2008

FOURTH SEMESTER

080120018 - STRENGTH OF MATERIALS

(COMMON TO AUTOMOBILE / MECHANICAL ENGG.)

Time : 3 Hours

Max.Marks : 100

PART - A

(10 x 2 = 20 Marks)

ANSWER ALL QUESTIONS

1. What is meant by compressive stress?
2. What is meant by brittleness of a material?
3. Define point of contraflexure.
4. Draw SFD for a simply supported beam with uniformly distributed load (w/m).
5. What is meant by twisting moment?
6. State any four assumptions made in developing the equations for stresses subjected to pure torsion.
7. Bring out the significance of double integration method.
8. What is meant by a composite beam?
9. State the formula for strain energy in torsion.
10. What is meant by coupling?

PART - B

(5 x 16 = 80 Marks)

ANSWER ALL QUESTIONS

11. (a) Derive an expression for volumetric strain due to single direct stress.

(OR)

11. (b) Two bars, each of length L and of different materials are each subjected to the same tensile force P. The first bar has a uniform diameter D and the second bar has a diameter D/2 for a length L/4 and a diameter D for the remaining length. Compare the strain energies of the two bars if (a) $E_1/E_2 = 4/7$ (b) $E_1 = E_2$.

12. (a) A beam of span L, simply supported at the ends, is loaded with distributed load of intensity zero at the ends and 'W' per unit length at the centre. Plot the Shear Force and Bending Moment diagrams, indicating principal values.

(OR)

- (b) Derive an expression for the shear stress distribution over rectangular beam.

13. (a) A hollow steel shaft 5m long is to transmit 160 KW of power at 120 r.p.m. The total angle of twist is not to exceed 2° in this length and the allowable shear stress is 50 N/mm^2 . Determine the inside and outside diameters of the shaft, taking $N = 0.8 \times 10^5 \text{ N/mm}^2$.

(OR)

- (b) Derive an expression for the closed – coiled helical springs subjected to axial couple or torque.

14. (a) A horizontal beam of uniform section and length 'L' rests on supports at its ends. It carries a U.D.L of 'w' per unit length which extends over a length 'l' from the right hand support. Determine the value 'l' in order that the maximum deflection may occur at the left hand end of the load, and if the maximum deflection is wl^4/kEI , determine the value of 'k'.

(OR)

- (b) By using the Mohr's theorem, derive the area moment equations.

15. (a) A cylindrical shell 2m long and 90cm internal diameter and 12mm metal thickness is subjected to an internal pressure of 1.6 N/mm^2 . Determine (a) maximum intensity of shear stress, and (b) changes in the dimensions of the shell. Take $E = 2.1 \times 10^5 \text{ N/mm}^2$ and $1/m = 0.3$.

(OR)

- (b) What is the radial compressive stress for thick spherical shells? (Take r as internal radius and R as external radius)

*****THE END*****