Register Number | | | | | | | |

SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E-CIVIL
Title of the Paper: Mechanics of Solids – I — Max. Marks: 80
Sub. Code: 6C0081 — Time: 3 Hours
Date: 16/11/2010 — Session: FN

PART - A (10 X 2 = 20)

Answer ALL the Questions

1. State Hooke's law.

2. What is a bulk modulus?

3. What are the different types of beams?

4. What do you mean by point of contraflexure?

5. What do you mean by section modulus?

6. How would you find the bending stress in unsymmetrical section?

7. Define torsional rigidity.

8. What are applications of helical springs?

9. Define modulus of resilience.

10. Write an expression for maximum strain energy stored in a body.

PART – B (5 x 12 = 60)

Answer All the Questions

11. Find the Young's modulus of a brass rod of diameter 25mm and of length 250mm which is subjected to a tensile load of 50kN when the extension of the rod is equal to 0.3mm.

(or)

12. A steel rod 5m long and 30mm in diameter is subjected to an axial tensile load of 50kN. Determine the change in length, diameter and volume of the rod. Take E = $2x10^5 N/mm^2$ and Poisson's ratio = 0.25.

13. What are the points should be considered for drawing shear force and bending moment diagrams?

(or)

14. a cantilever of length 2m carries a uniformly distributed load of 1kN/m run over a length of 1.5m from the free end. Draw the shear force and bending moment diagrams for the cantilever beam.

15. A steel plate of width 120mm and of thickness 20mm is bent into a circular arc of radius 10m. Determine the maximum stress induced and the bending moment which will produce the maximum stress. Take E = $2x10^5 N/mm^2$.

(or)

16. A rectangular beam 100mm wide and 250mm deep is subjected to a maximum shear force of 50kN. Determine (a) Average shear stress (b) maximum shear stress (c) shear stress at a distance of 25mm above the neutral axis.

17. Determine the diameter of a solid steel shaft which will transmit 90kW at 160rpm. Also determine the length of the shaft if the twist must not exceed 1° over the entire length. The maximum

shear stress is limited to 60N/mm^2. Take the value of modulus of rigidity = 8x10^{4}N/mm^2.

(or)

18. A closely coiled helical spring of round steel wire 10mm in diameter having 10 complete turns with a mean diameter of 12cm is subjected to an axial load of 200N. Determine, the deflection of the spring and stiffness of the spring. Take C = 8x10^{4}N/mm^2.
19. A bar of uniform cross section A and length L hangs vertically subjected to its own weight. Prove that the strain energy stored within the bar is given by $U = \frac{A * l^2 \times L^3}{6E}$

(or)

20. A rod 12.5mm in diameter is stretched 3.2mm under a steady load of 10kN. What stress would be produced in the bar by a weight of 700N, falling through 75mm before commencing to stretch, the rod being initially unstressed take E = 2.1 x 10^{5}N/mm^2.