Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Mechanical Engineering) (Sem.–4)

STRENGTH OF MATERIALS-II

Subject Code : BTME-403-18

M.Code : 77548

Date of Examination : 14-05-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly:

(a) Define resilience.

(b) Write the formula to find total strain energy per unit volume.

(c) What is the importance of factor of safety in theories of failure?

(d) What do you mean by two-dimensional stress system?

(e) Distinguish between open and closed coiled springs.

(f) Define Circumferential stress and write its formula.

(g) At which point the maximum hoop stress in a thick pressure vessel under internal pressure occurs and why?

(h) What is importance of discs of uniform strength?

(i) Why the cross section of a crane hook is generally trapezoidal? Explain briefly.

(j) What is the significance of shear centre?

SECTION-B

2. State and explain Castigliano's theorem of reciprocal deflection.

3. State and explain shear strain energy theory along with its graphical representation. Also, derive equation for this theory.

4. A cylindrical shell 3 m long and 50 cm in diameter and 1.25 cm thick is at atmospheric pressure. Find its dimensions when it is subjected to an internal pressure of 2 MN/m^2. Take, E = 200 GN/m^2, and Poisson's ratio = 0.3.

5. A ring with a circular cross-section of 60 mm in diameter and a mean radius of 90 mm is subjected to a compressive load of 17 kN. Calculate the deflection of the ring along the load line. Take, E = 200 GN/m^2.

6. An I-section, with rectangular ends, has the following dimensions: Flanges: 15 cm × 2 cm, Web : 30 cm × 1 cm. Find the maximum shearing stress developed in the beam for a shearing force of 12 kN.

SECTION-C

7. A close-coiled helical spring is to have a stiffness of 100 N/m in compression, with a maximum load of 50 N and a maximum shearing stress of 108 N/mm^2. The solid length of the spring (i.e. coils touching) is 45 mm. Find : (a) The wire diameter (b) The mean coil radius (c) The number of coils. Take modulus of rigidity of material of the spring as 0.35×10^5 N/mm^2.

8. A thick cylinder of 150 mm outside radius and 100 mm inside radius is subjected to an external pressure of 30 MN/m^2 and internal pressure of 60 MN/m^2. Calculate the maximum shear stress in the material of the cylinder at the inner radius.

9. Write short notes on :

(a) Stresses in rotating discs

(b) Importance and applications of compound cylinders

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.