

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 : 21-06-2023

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 energy of distortion.
- b) What is significance of resilience?
- c) State and explain maximum principal stress theory.
- d) Write the applications of close coiled helical springs?
- e) What is significance of full-length leaves in a leaf spring?
- f) For what purpose compound cylinders are used?
- g) Name various types of stresses in crane or chain hooks.
- h) What is significance of rims of uniform thickness?
- i) What do you mean by shear centre?
- j) What do you mean by compound cylinders?

SECTION-B

2. A steel bar 5 cm by 5 cm in section, 6 m long is subjected to an axial pull of 150 kN. Taking $E = 200 \text{ GN/m}^2$ Calculate the change in the length of bar. Also find the amount of energy stored in bar during the extension.
3. A shaft is subjected to a maximum torque of 12 kNm and a maximum bending moment of 9 kNm at a particular section. If the allowable equivalent stress in simple tension is 180 MN/m^2 , find the diameter of the shaft according to the maximum shear stress theory.
4. Find the maximum safe air pressure in case of a cylindrical air drum having 3 m diameter with plates 1.2 cm thick. The efficiencies of the longitudinal and circumferential joints are respectively 70% and 45%, and maximum tensile stress in the plating is to be limited to 120 MN/m^2 .
5. A disc of 50 cm diameter and uniform thickness is rotating at 3000 r.p.m. Determine the maximum stress induced in the disc. If the hole of 10 cm diameter is drilled at the centre of the disc, determine the maximum intensities of radial and hoop stresses induced. Take Poisson's ratio = 0.33, density of disc = 7950 kg/m^3 .
6. Plot the shearing stress distribution and derive an expression for locating the shear centre for a rectangular section.

SECTION-C

7. An open-coiled helical spring of wire diameter 12 mm, mean coil radius 84 mm, helix angle 20° carries an axial load of 500 N. Find the shear stress and direct stress developed at inner radius of the coil.
8. Derive mathematically Lamé's equation.
9. **Write short notes on the following :**
 - a) Stress due to suddenly applied loads
 - b) Disc of uniform strength.

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.