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Total No. of Questions : 09

B.Tech.(ME) (2012 Onwards) (Sem.–4)

STRENGTH OF MATERIALS-II

Subject Code : BTME-401

M.Code : 59129

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION 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. Answer briefly :

(a) What do you mean by proof of resilience?

(b) What is energy of distortion?

(c) What is generally accepted criterion of failure of a component?

(d) What is maximum principal strain theory?

(e) Describe various types of springs.

(f) Why we use gauge pressure instead of absolute pressure in calculation of stresses in thin cylinders?

(g) For a crane hook, locate the plane, which is the severely stressed.

(h) State any two assumptions made in the analysis of curved beams.

(i) What is the importance of shear centre?

(j) Which type of stresses are produced in a rotating thin disc of uniform thickness?

SECTION-B

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

3. Explain why no single theory of failure can satisfy the condition of failure for all the materials.

4. A thin cylinder of 200 mm inside diameter is 4 mm thick. The ends of the cylinder are closed by rigid plates and then it is filled with water under pressure. If external axial pull of 75 kN is applied to the ends, the water pressure falls by 0.12 MPa. Find the value of poisson's ratio. K= 2100 MPa and E= 150 GPa.

5. A compound cylinder is formed by shrinking one tube to another, the inside and outside diameters of the outer tube being 120 mm and 180 mm respectively and of the inner tube being 60 mm and 120 mm respectively. After shrinking the radial pressure at the common surface is 30 MPa. If the cylinder is subjected to an internal pressure of 80 MPa, determine the final stresses set up at various surfaces of the cylinder.

6. A steel ring of 240 mm mean diameter has a rectangular cross-section of 60 mm x 40 mm, the larger section being in the radial direction. Determine the tensile force which the ring can carry safely if the permissible stresses is 140 MPa.

SECTION-C

7. An open coil helical spring has 10 coils and is made out of a 12 mm diameter steel rod. The mean diameter of the coils is 80 mm and the helix angle 15°. Find the deflection under an axial load of 250 N. What are the maximum intensities of direct and shear stresses induced in the section of the wire? If the above load is replaced by an axial torque of 60N-m, determine the axial deflection and the angle of rotation about the axis of the coil. Take G as 80 GPa and E as 204 GPa.

8. A solid disc of uniform thickness and having diameter of 400 mm rotates at 7500 *rpm*. Determine the radial and hoop stresses at radii of 0, 50 mm, 100 mm. 150 mm and 200 mm. Density of the material is 7500 kg/m^3 .What are the maximum values of the radial, hoop and shear stresses?

9. A cast iron bracket of I-section has its top flange as 200 mm × 40 mm, bottom flange as 120 mm × 40 mm and the web as 300 mm x 40 mm. The overall depth of the section is 380 mm. The bracket is subjected to bending. If the maximum tensile stress in the top flange is not to exceed 15 MPa, determine the bending moment the section can take. If the beam is subjected to a shear force of 150 kN, sketch the stress distribution over the depth of the section.

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.