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

Total No. of Questions : 09

B.Tech.(ME) (2011 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 is energy of distortion?

b) What is the necessity of theory of failure?

c) Define stiffness of the spring.

d) For what purposes cylindrical and spherical shells are used?

e) State Lame's equation.

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

g) What is meant by trapezoidal section?

h) Where does the maximum vertical shear stress occur in an I-section?

i) Discuss the importance of shear centre.

j) Identify three principal stresses in a thick cylinder.

SECTION-B

2. Compare the strains produced in a body subjected to same amount of load when applied gradually and when suddenly.

3. A closed coil helical spring has mean diameter of 75 mm and spring constant of 80 kN/m. It has 8 coils. What is the suitable diameter of the spring wire if maximum shear stress is not to exceed 250 MN/m^2? Modulus of rigidity of the spring wire material is 80 GN/m^2. What is maximum axial load the spring can carry?

4. For a thin cylindrical shell, the length/diameter ratio is 3 and its volume is 20 m^3. The safe tensile stress, for the shell material is 100 MPa. Determine the cylinder diameter and wall thickness if it is to contain water at an absolute pressure of 2 MPa.

5. Two closed coiled helical steel springs are connected in series to form a composite spring of stiffness 1.5 kN/m. In both the springs, mean coil radius is 4 times the wire diameter. One spring is made out of 3 mm diameter wire and has 20 turns, whereas the other spring has 15 turns. Determine the wire diameter in case of second spring. C = 80 GPa.

6. Write a brief note on stress in rotating discs.

SECTION-C

7. A bar of mild steel carries an axial pull of 10 kN and a transverse shear force of 5 kN. Taking the elastic limit in tension as 240 MPa, a factor of safety 3 and Poission's ratio 0.3, calculate the diameter of the bar if the criterion is (i) Maximum principle stress theory, (ii) Maximum strain energy theory.

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. A beam 100 mm wide and 150 mm deep in cross-section is simply supported and carries a uniformly distributed load over its entire span of 2 m. If the allowable stresses for the beam material are 30 MPa in bending and 2 MPa in shear, calculate the maximum load which the beam can carry.

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.