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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech (Industrial Engineering) (Sem.–3)

STRENGTH OF MATERIALS

Subject Code : IE-201

Paper ID : [A0995]

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. Answer briefly :

a) What is volumetric strain?

b) What is principal stress?

c) What is a cantilever?

d) Define section modulus.

e) State the assumptions in deriving torsion equation.

f) Define proof resilience.

g) What is a master leaf?

h) State Lame's equation.

i) What is hoop stress?

j) What is a theory of failure?

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SECTION-B

2. Discuss in detail the stress - strain curve for a ductile material.

3. Draw the shear force and bending moment diagrams for the simply supported beam carrying a concentrated load at its mid span.

4. A hollow shaft with ratio of its diameters as $\sqrt{3}$ transmits 4000 kW at 110 rpm when the energy stored is 2100 J/m^3 of material. Calculate the shaft diameter if C = 80 GPa.

5. A cylindrical vessel 2 meters long, 500 mm external diameter and 10 mm thick is made of steel. The vessel is subjected to an internal fluid pressure of 1 MPa. Calculate the change in external diameter and length. Take for steel, E 200 GPa and v = 0.3.

6. Describe the characteristics features of different types of springs. Give example of the application of each type.

SECTION-C

7. A solid steel shaft of 2 meter length is to transmit 50 kW at 150 rpm. If the shear stress in the shaft material is not to exceed 50 MPa and maximum allowable twist in the shaft is 1°, calculate the shaft diameter. C = 80 GPa.

8. Derive expression for the strain energy absorbed in a single leaf spring and derive the shape of the constant strength single leaf spring. Prove that such spring would bend into circular arc.

9. Write a note on maximum principal stress theory.

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