

Total No. of Questions : 09

B.Tech. (CE) (2011 Onwards) (Sem. – 3)

STRENGTH OF MATERIALS

M Code: 56074

Subject Code: BTCE-303

Paper ID: [A1133]

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. a) What are the various types of stresses? Explain.
b) What are the various types of loads to which beams are subjected to?
c) What do you mean by pure bending?
d) What are the various assumptions made in the Euler's theory?
e) Explain various types of beams.
f) Define the term equivalent length? Discuss its uses.
g) Define polar modulus of the shaft section.
h) Explain the terms 'torsional rigidity'
i) What is point of contraflexure?
j) Describe the effect of couple on SF and BM diagrams of a beam.

SECTION B

2. A bar of steel is of length L and is of the uniform thickness T . The width of the bar varies uniformly from a at one end to b at the other end. Find the extension of the rod when it carries an axial pull P .
3. A beam AB 10 m long has supports at its ends A and B. It carries a point load of 5kN at 3m from A and a point load of 5 kN at 7m from A and a uniformly distributed load of 1 kN per metre between the point loads. Draw SF and BMD for the beam.
4. A hollow shaft of diameter ratio $3/8$ is to transmit 375 kW at 100 rpm. The maximum torque being 20% greater than the mean, the shear stress is not to exceed 60 N/mm^2 and the twist in a length of 4 m is not to exceed 2 degrees. Calculate its external and internal diameters which would satisfy both the above conditions. Take $C = 8.5 \times 10^4 \text{ N/mm}^2$.
5. Explain Maximum shear stress theory in detail.
6. A point in a plate girder is subjected to a horizontal tensile stress of 1000 kg/cm^2 . And a vertical stress of 600 kg/cm^2 . Find by Mohr's circle, the direction of principal strains and the magnitude of principal stress.

SECTION C

7. A mild steel tube whose external and internal diameters are 50mm and 40mm respectively can safely carry a maximum point load of 870 N at the centre on a span of 5m. If three such tubes welded to each other is used as a simply supported beam of span 5m. Find the safe maximum point load that can be applied at the centre of the span.
8. A torsional pendulum consists of a horizontal disc of mass 100 kg suspended by a 4mm diameter, 2m long vertical steel wire. Find the maximum angle of rotation (amplitude of torsional vibration) so that the tensile stress in the wire does not exceed 100 N/mm^2 and the maximum shear stress does not exceed 50 N/mm^2 . Take $C = 8 \times 10^4 \text{ N/mm}^2$.
9. Explain the inter relation between bending moment and shear force in a beam.