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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CE) (2012 to 2017) (Sem.-3)

STRENGTH OF MATERIALS

Subject Code : BTCE-303

M.Code : 56074

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) Give classification of materials.
- b) What is point of contraflexure?
- c) What are bending and shear stresses?
- d) List various assumptions made in the theory of pure bending.
- e) Define Columns, Post and struts.
- f) What are the limitations of Euler's formula?
- g) Define Torsional Rigidity.
- h) Explain various types of beams.
- i) Define the term equivalent length. Discuss its uses.
- j) Define polar modulus of the shaft section.

SECTION-B

2. A load of 270 kN is applied on a short concrete column 250 mm $\times$ 250 mm. The column is reinforced with 8 bars of 16 mm diameter. If the modulus of elasticity of steel is 18 times that of concrete, find the stresses in concrete and steel. If the stresses in concrete shall not exceed 4 N/mm², find the area of steel required so that the column may support a load of 400 kN.
3. The intensity of loading on a simply supported beam of 5 m span increases uniformly from 8 kN/m from one end to 16 kN/m to the other end. Find the position and magnitude of the maximum bending moment. Also draw shear force and bending moment diagrams.
4. Find the width and depth of the strongest beam that can be cut of a cylindrical log of wood whose diameter is 500 mm.
5. A hollow cast iron column 5 m long is fixed at both ends and has an external diameter of 300 mm. The column supports an axial load of 1200 kN. Find the internal diameter of the column, adopting a factor of safety of 5. Take $f_c = 550$ N/mm² and $\alpha = 1/1600$.
6. In a tensile test, a test piece 25 mm in diameter, 200 mm gauge length stretched 0.0975 mm under a pull of 50000 N. In a torsion test, the same rod twisted 0.025 radians over a length of 200 mm, when a torque of 400 Nm was applied. Evaluate the Poisson's ratio and the three elastic moduli for the material.

SECTION-C

7. Explain the inter relation between bending moment and shear force in a beam.
8. A hollow steel shaft 100 mm external diameter and 50 mm internal diameter transmits 600 kW at 500 rpm and is subjected to an end thrust of 45 kN. Find what bending moment may be safely applied to the shaft if the greater principal stress is not to exceed 90 N/mm².
9. Derive an expression to determine critical load on column with one end fixed and other hinged.

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.