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

Total No. of Questions : 18

B.Tech.(CE) (2018 Batch) (Sem.–3)

SOLID MECHANICS

Subject Code : BTCE-302-18

M.Code : 76371

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

Write briefly :

1) Illustrate Euler's bucking load for column.

2) State the theorems of Moment Area Method suggested by Mohr.

3) Discuss the importance of sign conventions to draw shear force and bending moment diagrams.

4) Write down the expression for maximum deflection of a simply supported beam of span 'L' carrying a concentrated load 'W' at the center of the beam.

5) Define slenderness ratio.

6) A simply supported beam AB of span 5m is subjected to 20 kN/m udl over the whole span. Determine the maximum bending moment.

7) Define stress and give its various types.

8) Mention the various types of loads to which beams are subjected to`?

9) Define the terms 'Torsional Rigidity' and 'Torsional Flexibility'

10) What do you mean by pure bending?

SECTION-B

11) At a certain point in a strained material, the stresses on two mutually perpendicular planes are 30 Mpa and 20 Mpa both tensile. They are accompanied by a shear stress of 20 Mpa. Find graphically, the location of the principal planes and evaluate the principle stresses.

12) Derive the relationship between Young's Modulus, Modulus of Rigidity and Bulk Modulus.

13) A pin-ended square cross-section column of length 3m is subjected to a compressive stress of 20 MPa. Using a factor of safety of 2.5, find the cross-section if the column is to safely support a 200 kN load. Take E for the material of the column to be 15 GPa.

14) A simply supported beam of span 3.9 m has to resist a shear force of 140 kN. The cross section of the beam is a T-section with flange width of 130 mm, web and flange thicknesses of 16mm each and overall depth of 180mm. Determine the maximum shear stress induced in the beam and draws the shear stress distribution for the beam section.

15) A cylinder of thickness 2 cm, has to withstand maximum internal pressure of 1.5 N/mm^2.If the ultimate tensile stress in the material of the cylinder is 300 N/mm^2, factor of safety 3.0 and joint efficiency 80%, determine the diameter of the cylinder.

SECTION-C

16) A simply supported beam ABC with supports at A and B, 7m apart and with an overhang BC of length 3 m carries a uniformly distributed load of 15 kN/m over the whole length which is 10 m. Draw the bending moment and shear force diagrams. Find the position and value of maximum bending moment also determine the point of contraflexure if any.

17) A solid circular shaft and a hollow circular shaft whose inside diameter is 0.75 times of the outside diameter, are of same material, of equal lengths and are required to transmit a given torque. Compare the weights of these two shafts if the maximum shear stress developed in the two shafts are equal.

18) A beam of span AB is 4m long and is simply supported at the ends. It carries a concentrated load of 10 kN at 1m from the left support A and carrying a uniformly distributed load of 5kN/m at the 2m from the right support B. Use Macaulay's Method to determine the slope at the left support A and deflection under the concentrated load. Take EI = 2000 KNm^2.

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.