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

Total No. of Questions : 18

B.Tech. (ME) (2018 Batch)   (Sem.–3)
STRENGTH OF MATERIALS-I
Subject Code : BTME-304-18
M.Code : 76421

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. Distinguish between longitudinal and lateral strain.

2. What do you mean by two dimensional stress system? Give a practical example.

3. Define Shear Force and give its sign conventions.

4. Write the relation between loading, shear force and bending moment.

5. What do you mean by composite beams? Show a composite beam with a sketch.

6. Define Torsion. What is the difference between torsion and torque?

7. Give classification of columns.

8. Define Slenderness Ratio.

9. Give units of slope and deflection.

10. Name various methods used to find slope and deflection.

SECTION-B

11. Derive relation to find elongation produced in a bar due to its self weight.

12. A simply supported beam of 10 m length carries concentrated loads of 4 kN, 2 kN and 4 kN at distances 3 m, 5 m and 7 m respectively from the right support. Draw shearing force and bending moment diagrams.

13. A shaft is used to transmit 37.5 kW at 100 rpm. If the allowable shear stress is 70 MN/m^2, find the diameter of the shaft. The maximum torque transmitted on each revolution exceeds the mean by 30%.

14. Calculate the safe compressive load on a hollow cast iron column one end rigidly fixed and other pin jointed, 150 mm outer and 100 mm inner diameter, 10 metres long. Use Euler's formula with a factor of safety of 5 and take, E = 90 GN/m^2.

15. A simply supported beam of length L carries a uniformly distributed load of w per unit length over the whole span. Using double integration method, find slope and deflection at mid and end points.

SECTION-C

16. An element in a stressed material has tensile stress of 500 MN/m^2 and a compressive stress of 350 MN/m^2 acting on two mutually perpendicular planes and equal shear stresses of 100 MN/m^2 on these planes. Find principal stresses and position of principal planes by using Mohr's circle method. Also find maximum shearing stress.

17. Three beams have the same length, the same allowable stress and the same bending moment. The cross-sections of the beams are a square, a rectangle with depth twice the width and a circle. Determine the ratios of weights of the circular and the rectangular beams with respect to the square beam.

18. Write short notes on :

   a) Mohr's circles of stress and its applications.

   b) Explain the terms : Modulus of rupture, and torsional rigidity, and write their significance.

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.