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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Automation & Robotics) (2018 Batch) (Sem.-3)

STRENGTH OF MATERIALS

Subject Code : BTAR-302-18

M.Code : 76501

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. Define Hooke's law.
2. What is Volumetric Strain?
3. What is the ratio of the torques transmitted by a hollow and a solid shaft of the same material, length and weight?
4. If a bar is stretched in such a manner that all the lateral strain is prevented, what is the poison's ratio?
5. What is the Spring Stiffness?
6. What do you understand by 0.2% proof stress?
7. Define Hoop Stress.
8. What is difference between neutral layer and neutral axis?
9. Why is the longitudinal stress in a thin cylinder zero?
10. Define polar moment of inertia.

SECTION-B

11. A beam is simply supported and carries a uniformly distributed load of 40 kN/m run over the whole span. The section of the beam is rectangular having depth as 500 mm . If the maximum stress in the material of the beam is 120 N/mm^2 and moment of inertia of the section is $7 \times 10^8\text{ mm}^4$, find the span of the beam.
12. A thin spherical vessel 200 mm diameter and 5 mm thick is filled with water. More water is pumped in until the pressure reaches 4.5 MPa . How much extra water was required to reach this pressure?
13. Drive an expression for shear stress produced in a circular shaft subjected to torsion.
14. Two vertical rods one of steel and other of copper are rigidly fixed at the top and 50 cm apart. Diameters and lengths of each rod are 2 cm and 4 m respectively. A cross bar fixed to the rods at the lower end carries a load of 5000 N such that the cross bar remains horizontal even after loading. Find the stress in each rod and the position of the load on the bar. Take E for steel and copper as $2 \times 10^5\text{ N/mm}^2$ and $1 \times 10^5\text{ N/mm}^2$.
15. A simply supported beam carries a uniformly distributed load ' w ' all along its length. Calculate the maximum deflection assuming that EI is constant.

SECTION-C

16. A body is subjected to direct stresses in two mutually perpendicular directions accompanied by a simple shear stresses. Draw the Mohr's circle of stresses and explain how will you obtain the principal stresses and principal planes?
17. A simply supported beam of length 8 m rests on supports 6 m apart, the right hand end is overhanging by 2 m . The beam carries a uniformly distributed load of 1500 N/m over the entire length. Draw S.F. and B.M. diagram and find the point of contra flexure, if any.
18. Write short note on :
 - a. Spherical shells
 - b. Maxwell's reciprocal theorem

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.