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Roll No. Total No. of Pages : 02 Total No. of Questions : 18 B.Tech.(Automation & Robotics) (2018 Batch) (Sem3) 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.
have to attempt any TWO questions. SECTION-A
SECTION-C contains TREE questions carrying TEN marks each and students have to attempt any TWO questions. SECTION-A Write briefly :
 SECTION-C contains TREE questions carrying TEN marks each and students have to attempt any TWO questions. SECTION-A Write briefly : Distinguish between longitudinal and transverse strain.
 SECTION-C contains TREE questions carrying TEX marks each and students have to attempt any TWO questions. SECTION-A Write briefly : Distinguish between longitudinal and transverse strain. Define modulus of rigidity and bulk modulus.
 SECTION-C contains TIKEL questions carrying TEX marks each and students have to attempt any TWO questions. SECTION-A Write briefly : Distinguish between longitudinal and transverse strain. Define modulus of rigidity and bulk modulus. Give the classification of beams.

- 3. Give the classification of beams.
- 4. Define point of contraflexure.
- Distinguish between moment of inertia and polar moment of inertia. 5.
- Define bending stress and write its units. 6.
- Define stiffness of close coiled helical spring and write its formula. 7.
- 8. Distinguish between thin and thick cylinders.
- 9. Write the formula to find power transmitted by shaft.
- 10. What do you mean by build up cylindrical shells?



SECTION-B

- 11. A square steel rod 20 mm \times 20 mm in section is to carry an axial compressive load of 100 kN. Calculate the shortening in a length of 50 mm. E = 2.14×10^6 kN/m².
- 12. Explain the procedure to construct Mohr's circle for a body subjected to two perpendicular direct stresses.
- A simply supported beam of 10 m span carries the concentrated loads of 4 kN, 5 kN and 3 kN at distances 3, 7 and 11m respectively from one end. Draw shearing force and bending moment diagrams.
- 14. A timber beam 150 mm \times 250 mm in cross-section is simply supported at its ends and has a span of 3.5 m. The maximum safe allowable stress in bending is 7500 k N/m². Find the maximum safe uniformly distributed load which the beam can carry. What is the maximum shear stress in the beam for the UDL calculated?
- 15. A simply supported beam is having length L and it carries a point load W at its mid span. Derive the formulae to find maximum deflection and maximum slope using double integration method.



- 16. A hollow shaft, having an inside diameter 60% of its outer diameter is to replace a solid shaft transmitting the same power at the same speed. Calculate the percentage saving in material, if the material to be used is also the same.
- 17. A boiler shell is to be made of 15 mm thick plate having tensile stress of 120 M N/m². If the efficiencies of the longitudinal and circumferential joints are 70% and 30% respectively, determine :
 - a) Maximum permissible diameter of the shell for an internal pressure of 2 M N/m^2 , and
 - b) Permissible intensity of internal pressure when the shell diameter is 1.5 m.
- 18. a) Explain theorem of perpendicular axes to find moment of inertia.
 - b) Write a note on 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.

2 M-76501

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