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Total No. of Questions : 18

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B.Tech. (ME) (2012 Onwards) (Sem.-4) STRENGTH OF MATERIALS-II Subject Code : BTME-401 M.Code : 59129

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.

SECITON-A

Write briefly on the following :

- 1. What is proof resilience?
- 2. Define Maxwell's theorem of reciprocal deflection.
- 3. Draw failure envelope for maximum principal stress theory.
- 4. What are closed coiled springs and what is the use of these springs?
- 5. What do you mean by discs of uniform strength?
- 6. Define Strain Energy and discuss about impact loading.
- 7. Name the important theories of failure.
- 8. Why leaf spring is called a spring of uniform strength?
- 9. What do you mean by compound cylinder?
- 10. Discuss various types of stresses in crane or chain hooks.

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SECTION-B

- 11. State and explain Castigliano's theorem.
- 12. Explain why no single theory of failure can satisfy the failure condition for all materials?
- 13. A closely coiled helical spring of round steel wire of 10mm in diameter having 10 complete turns with a mean diameter of 12cm is subjected to an axial load of 200N. Determine : (i) The deflection of the spring (ii) Maximum shear stress in the wire (iii) Stiffness of the spring. Take modulus of rigidity, $G = 8 * 10^4 N/mm^2$.
- 14. A steam turbine rotor is running at 4200rpm. It is designed for uniform strength for a stress of $85MN/mm^2$. If the thickness of the rotor at the centre is 25mm and density of the material is $800kg/m^3$, then find the thickness of the rotor at a radius of 350mm.
- 15. Plot the shearing stresses distribution and derive an expression for locating the shear centre for a rectangular section.

SECTION-C

- 16. Explain in detail the procedure of finding resultant stress in case of :
 - a) Circular ring
 - b) Chain link, when they are subjected to a tensile load along the longitudinal axis.
- 17. Find the thickness of a metal necessary for a cylindrical shell of internal diameter 160mm to withstand an internal pressure of 8 N/mm². The maximum hoop stress in the section is not to exceed 35 N/mm².
- 18. A cylindrical thin drum 80cm in diameter and 3 m long has a shell thickness of 1cm. If the drum is subjected to an internal pressure of 2.5 N/mm², determine : (i) Change in diameter (ii) Change in length and (iii) Change in volume. Assume modulus of elasticity $E = 2 \times 10^5$ N/mm² and Poisson's ratio = 0.25.

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.

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