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

Total No. of Questions : 18

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.

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 $8 \, N/mm^2$. The maximum hoop stress in the section is not to exceed $35 \, N/mm^2$.

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 $2.5N/mm^2$, determine : (i) Change in diameter (ii) Change in length and (iii) Change in volume. Assume modulus of elasticity $E = 2 \times 10^5 \, N/mm^2$ 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.