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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Mechanical Engineering) (2018 Batch) (Sem.–4)

**STRENGTH OF MATERIALS-II**

Subject Code : BTME-403-18

M.Code : 77548

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. State distortion energy theory for failure.
2. Define the Toughness.
3. What is Hoop Shrinkage?
4. Define Proof Resilience.
5. Write Lamé's equation.
6. What is Prestressing?
7. Write the expression for maximum stress in flat spiral spring.
8. Explain a technique used to develop initial compressive stresses near the inside wall of the cylinder.
9. What are the most common uses of a spiral spring?
10. In case of a solid rotating circular disc the radial stress is maximum at .....

## SECTION-B

11. What do you understand by the term theory of failures? Explain any two theories of failure.
12. Using Castigliano's theorem find the deflection at the center of simply supported beam of length  $l$  carrying a triangular load which varies from zero at one end  $w$  per unit length at another end.
13. An I section beam  $350\text{mm} \times 200\text{mm}$  has a web thickness of  $12.5\text{mm}$  and a flange thickness of  $25\text{mm}$ . It carries a shearing force of  $200\text{kN}$  at a section. Sketch the shear stress distribution across the section.
14. What do you mean by disc of uniform strength? Find an expression for the thickness of a disc of uniform strength.
15. Two close coiled concentric helical springs of the same length are wound out of the same wire, circular in cross section and supports a compressive load  $P$ . The inner spring consists of 20 turns of mean diameter of  $16\text{cm}$  and Outer spring has 18 turns of mean diameter  $20\text{cm}$ , Calculate the maximum stress produced in each spring if diameter of wire  $=1\text{cm}$  and  $P=1000\text{N}$ .

## SECTION-C

16. A compound cylinder is made by shrinking a cylinder of external diameter  $300\text{mm}$  and internal diameter of  $250\text{mm}$  over another cylinder of external diameter  $250\text{mm}$  and internal diameter of  $200\text{mm}$ . The radial pressure at the junction after shrinking is  $8\text{ N/mm}^2$  find the final stress set up across the section, when the compound cylinder is subjected to an external fluid pressure of  $84.5\text{ N/mm}^2$ .
17. A closed ring of mean radius of curvature  $90\text{mm}$  is subjected to a pull of  $3\text{kN}$ . The line of action of load passes through the Centre of the ring. Calculate the maximum tensile and compressive stresses in the material of the ring is circular in cross section with diameter equal to  $15\text{mm}$ .
18. Write short note on :
  - a. Principal stresses and planes
  - b. Open-coiled spring

**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.**