Roll No. ....

OLE-24476

B. Tech. 7th Semester (ME)
Examination – April, 2021

STRENGTH OF MATERIAL-II

Paper : ME-401-F

Time : Three Hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all. Question No. **1** is *compulsory*. Remaining, attempt *one* question from each Section. Each question carries equal marks.

1. Explain the following : $5 \times 4 = 20$

     (a) Maxwell's Theorem

     (b) Ellipse of Inertia

     (c) Leme's Equation

     (d) Stresse in Crane Hooks

SECTION – A

2. A beam 4m in length is simply supported at the ends and carries a uniformly distributed load of 5 kN/m length. Determine the strain energy stored in the beam. E = 200 GPa, I = 1200 cm⁴.   **20**

3. (a) Write in brief various Theories of Elastic Failure.

    (b) A circular shaft of 3 cm diameter is 2 m long. It is required to transmit 7.5 kW at 80 rpm. Determine the strain energy stored in the shaft. G = 84 GPa.

        20

SECTION – B

4. Explain the following terms in detail :   **20**

    (a) Shear centre and the flexural axis

    (b) Slope of the natural axis

5. A boiler is subjected to an internal team pressure of 2N/mm². The thickness of the boiler plate is 2.6 cm and the permissible tensile stress is 120 N/mm². Find out the maximum diameter, when efficiency of longitudinal joint is 90% and that of circumferential joint is 40%.   **20**

SECTION – C

6. Derive the expression for Lamne's Equation for thick cylindrical shell. **20**

7. A steel disc of uniform thickness of diameter 90 mm is rotating about its axis at 3000 rpm. Determine the radial and circumferential stresses at the centre and the outer radius. The density of the material is 7800 kg/m² and Poisson ratio = 0.3. **20**

SECTION – D

8. Determine : **20**

   (a) Position of neutral axis

   (b) Maximum and minimum stresses when curved beam of circular section of diameter 100 mm is subjected to pure bending moment of +11.5 KN-m. The Radius of curvatureis 100 mm.

9. Explain in details : 20

    (a) Open coiled helical spring subjected to axial load and twisting moment

    (b) Concentric spring

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