*Roll No. ...........................*

# OLE-3208

## B. Tech. 5th Semester (ME) Examination – April, 2021

### SOLID MECHANICS

### Paper : PCC-ME-303-G

*Time : Three Hours ]*      *[ Maximum Marks : 75*

*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, selecting *one* question from each Section. Question No. **1** is *compulsory*. All questions carry equal marks.

**1.** All parts carry equal marks :      $2.5 \times 6 = 15$

   (a) Define Solid Mechanics

   (b) Explain in short note on Ellipse of inertia.

   (c) What is Leaf springs ?

(d) Explain in short note on Lame's equations.

(e) What is Flat spiral springs ?

(f) Explain Stresses in crane hooks.

## SECTION – I

**2.** Explain and derive the Castigliano's & Maxwell's theorems. 15

**3.** Write a short note on Theories of Elastic Failure? Explain various theories of elastic failures with derivations and graphical representations. 15

## SECTION – II

**4.** Write a short note on :

(a) Slope of the Neutral Axis 7.5

(b) Shear Center and the Flexural Axis 7.5

5. A leaf spring consists of nine steel plates, each 50 mm wide and 4mm thick. What should be the length of the spring if is to carry a central load of 5 kN. The stress does not exceed 160 MPa ? Calculate also the deflection at the centre of the spring. Taking E for the spring material as 210 GPA.                    15

## SECTION – III

6. Explain Wire Wound Cylinders. How does wire wounding effects hoop stress and longitudinal stress in thin walled cylinder subjected to internal pressure.

   15

7. Find an expression for the circumferential and radial stresses developed in a rotating solid disc.          15

## SECTION – IV

8. Explain and derive stresses in crane hooks and rings of circular.                                        15

**9.** Write a short note on the following :

    (a)  Trapezoidal Sections            7.5

    (b)  Deflection of Curved Bars & Rings    7.5

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