

Roll No.

22231

**M. Tech 2nd Sem. (Mechanical Engg.)
(Machine Design)
Examination – May, 2018**

THEORY OF ELASTICITY

Paper : M-802-A

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 any *five* questions. All questions carry equal marks.

1. The state of stress at a point is characterized by the components.

$$T_x = 100\text{MPa} \quad ; \quad T_y = -40\text{MPa}$$

$$T_z = 80\text{MPa} \quad ; \quad Z_{xy} = Z_{yz} = Z_{zx} = 0$$

Determine the value of shear stresses their associated normal stresses, the octahedral shear stresses and its associated normal stress.

20

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2. Explain complex stress function and corresponding displacement. 20
3. Derive the torsional equation of circular bar section. 20
4. A thick walled steel cylinder with radii $a = 15$ cm and $b = 30$ cm is subjected to an internal pressure. The yield stress in tension for material is 700 mpa. Using the factors of safety is 2, determine the maximum working pressure ? Corresponding to the major theories of failure. 20
- Taking $E = 207 \times 10^6$ Kpa, $\nu = 0.30$
5. Explain curvilinear co-ordinate and stress components. 20
6. Write short note on the following :
- (a) Membrane analogy 10
- (b) Edge dislocation 10
7. Explain the compatibility conditions and their physical significance. 20
8. Derive the transformation equation for 3-D stress state. 20