

Roll No.

22231

**M. Tech. 2nd Semester (Mechanical Engg.)
(Machine Design)**

Examination – May, 2016

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. Define principal stresses and principal directions. Show that the determination of principal stresses & directions reduces to the solution of an Eigen value problem. Discuss the existence of three real valued solutions for principal stresses. 20

2. Derive two dimensional elasticity problems in polar co-ordinates with example. 20
3. Explain the torsion of thick rectangular section. 20
4. (a) Explain the generalized statement of Hooke's Law. 10
 (b) Explain the state of strain at a point and its notations. 10
5. Explain curvilinear co-ordinates and stress components. 20
6. At a point P in a body, $T_x = 10000 \text{ N/cm}^2$
 $T_y = 5000 \text{ N/cm}^2$; $T_z = 5000 \text{ N/cm}^2$.
 $Z_{xy} = Z_{yz} = Z_{zx} = 10000 \text{ N/cm}^2$.
 Determine normal and shear stresses on a plate that is equally inclined to all the three axis. 20
7. Explain complex stress functions and corresponding displacements. 20
8. Derive the equation of Bending of a simply supported beam of uniformly distributed load. 20