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.

$$T_x = 100MPa \quad ; \quad T_y = -40MPa$$

$$T_2 = 80MPa \quad ; \quad Z_{xy} = Z_{yz} = Z_{zx} = 0$$

Determine the value of shear stresses their associated normal stresses, the octahedral shear stresses and its associated normal stress. 20

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, $v = 0.30$

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
