22231

M.Tech. 2nd Semester Mechanical Engg. (Machine Design) Examination, May–2017

THEORY OF ELASTICITY

Paper–M-802-A

Time allowed : 3 hours]   *[Maximum marks : 100*

Note : *Attempt any five questions. All questions carry equal marks.*

1. What is generalized Hooke's law ? Establish the stress-strain relationship for isotropic materials and hence the relationship between E,G and K.   20

2. Derive the transformation equation for 3D stress state. Explain stress ellipsoid.   20

3. A cantilever beam of span 1, unit width, depth 2C is subjected to a concentrated load P at the free end. Assuming a stress function j=Axy + (B/6xy3, determine the stresses sxx, syy and txy. Give your comments on results obtained.   20

4. Discuss the concept of two dimensional elasticity problems in polar coordinates.   20

5. Sketch the stress-strain distribution for elastic plastic yielding of a beam. Also calculate the bending moment

in the elastic-plastic state. The beam has rectangular cross section with width b and height h. 20

6. Explain the torsion of thin rectangular section. 20

7. Discuss the Curvilinear coordinates and stress components in detail. 20

8. Write short notes on the following :

   (a) Mohr's circle

   (b) Thick cylinder

   (c) Application of energy method to torsion problem.

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