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**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 $j = Axy + (B/6)xy^3$, determine the stresses s_{xx} , s_{yy} and t_{xy} . 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

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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. 20

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