

Reg.No.:.....

Name :

**Fifth Semester B.Tech. Degree Examination, 2015
(2013 Scheme)**

**Branch: Aeronautical Engineering
13.506.2 : THEORY OF ELASTICITY**

Time. 3 Hours

Max.Marks : 100

Answer all questions

PART A

(10x2= 20Marks)

1. Define theory of elasticity?
2. What is Saint Venant's principle?
3. Write down the relationship between modulus of elasticity and modulus of rigidity?
4. Define the principle plane and principle stress?
5. Write down the expression for 2D stress components in Cartesian coordinate system in terms of stress function?
6. Explain about Bi-harmonic equations?
7. Describe about Mchell's problems?
8. What is Navier's theory?
9. Explain about classical plate theory?
10. Give short notes on Prandtl's theory of torsion.

PART-B

(4x20=80 Marks)

Answer One Question From Each Module

MODULE-I

11. What is generalized Hooke's law? Establish the stress – strain relationship for

isotropic materials and hence the relationship between E, G and K.
(20)

- 12.a) Explain the compatibility conditions and their physical significance. Derive Beltrami – Mitchell compatibility equations in plane strain. (10)
b) Derive the equations of Equilibrium in 2D case. (10)

MODULE-II

13. a) Explain the use of Airy stress function in the solution of two dimensional problems in elasticity. (10)
b) Discuss plane stress and plane strain problems with examples. (10)

(OR)

14. Derive the expression for a principle stresses of a general biaxial stress field in 2D Cartesian coordinate system. Also obtain the expression for maximum shear stress and its plane. (20)

MODULE-III

15. Derive the equilibrium equations in polar coordinates system (20)

(OR)

16. Obtain the general solution for biharmonic equation of a axisymmetric problem (20)

MODULE-IV

17. Derive the expression for stress distribution in a solid circular rotating disc. (20)

(OR)

18. Obtain the stress distribution and the expression for the warping of an elliptical section using stress function approach. (20)