Reg. No. | | | | | | | | | | |

Q.P. Code: 16CE2002 **R16**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

M.Tech I Year I Semester (R16) Supplementary Examinations June 2017

THEORY OF ELASTICITY

(Common to Structural Engineering)

(For Students admitted in 2016 only)

Time: 3 hours Max. Marks: 60

(Answer all Five Units 5 X 12 =60 Marks)

UNIT-I

1 a. Obtain the various components of strains in terms of deformations. 4M

b. Derive the compatibility equations for a plane stress and plane strain problems. 8M

OR

2 a. Obtain the governing differential equation in terms of stress function for a two-dimensional problem. Adopt body force. 6M

b. Distinguish between the Plane stress and Plane starin problems. 6M

UNIT-II

3 Derive the expression for the maximum vertical deflection of a cantilever beam of span '*L'* and depth '*2d*' subjected to a concentrated load '*W*' at its free end. Assume the width of the beam is unit. 12M

OR

4 Derive the expressions for the various stress components at any section of a simply supported beam of span *'L'* and subjected to uniformly distributed load *'w/m'* over its entire span. Adopt the cross-section of the beam is unit width and depth '*2d'*. Use Fourier series. 12M

UNIT-III

5 Derive the stress components at any section of a curved prismatic member of narrow rectangular cross-section subjected to pure bending '*M*'. 12M

OR

6 A circular plate of radius '*R*' has a concentric hole of radius *'r'*. The plate is subjected to uniform internal and external pressures σ_1 and σ_2 respectively. Determine the various stress components at any point of the plate. 12M

UNIT-IV

7 Determine the principal stresses if the state of strain at a point in a stained 3D-Steel structural component is $\begin{bmatrix} 400 & 275 & 225 \\ 275 & 250 & 175 \\ 225 & 175 & 125 \end{bmatrix} \times 10^{-6}$ 12M

OR

8 a. Explain the stress ellipsoid and stress-director surface for a 3D-state of stress. 6M

b. Derive the equations of equilibrium in terms of displacements of a 3D-state of stress. 6M

UNIT-V

9 Determine the torsional rigidity of a shaft of cross-section equilateral triangle of side '*a*'. 12M

OR

10 Determine the maximum shear stress and the corresponding twist of a shaft of narrow rectangular cross-section subjected to torsion. 12M