

Code No: G3503/R13

M. Tech. I Semester Supplementary Examinations, December-2016

THEORY OF ELASTICITY
Computer Aided Structural Engineering

Time: 3 hours

Max. Marks: 60

Answer any FIVE Questions
All Questions Carry Equal Marks

1. The state of stress at a point is given by
 $\sigma_x=100, \sigma_y=200, \sigma_z=-100, \tau_{xy}=-200, \tau_{yz}=100, \tau_{xz}=-300 \text{ kPa}$.
 Determine
 - a) The stress invariants
 - b) The principal stresses
 - c) The direction cosines of the principal planes
2. If $\sigma_x = pyx^3 - 2axy + by$, $\sigma_y = pxy^3 - 2px^3y$, $T_{xy} = -3/2 px^2y^2 + ay^2 + p/2 x^4 + c$ represents the stress distribution for a thin plate in plane stress condition find the stress function ϕ corresponding to the stress distribution.
3. Explain about
 - a) saint venant principle
 - b) Airy stress function
4. Starting from general solution $\phi = A \log r + B r^2 \log r + C r^2 + D$. Obtain the expression for radial and hoop stresses in a thick cylinder subjected to internal fluid pressure.
5. Derive the governing equations in polar co-ordinates in radial and tangential directions?
6. Discuss about
 - a) Homogeneous deformation-
 - b) principle axis of strain rotation
7. A hollow circular torsion member has an outside diameter of 22mm and inside diameter of 18mm, with mean diameter $D=20\text{mm}$ AND $t/D=0.10$. calculate the torque and angle of twist per unit length if shearing stress at mean diameter is 70MPa. Calculate these values if a cut is made through the wall thickness along the entire length $G=77.5 \text{ GPa}$
8. Discuss about
 - a) hydro dynamical analogies
 - b) Torsion of rectangular bars
