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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

M.Tech I Year I Semester Regular Examinations July-2021**ADVANCED SOLID MECHANICS**

(Structural Engineering)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

- 1 a State Hooke's law and explain about pure shear. L2 6M
 b Explain about components of strain at a point. L2 6M

OR

- 2 The state of stress at a point is given by $\sigma_{xx} = 10\text{MPa}$, $\sigma_{yy} = 20\text{MPa}$, $\sigma_{zz} = 10\text{MPa}$, $\tau_{xy} = 20\text{MPa}$, $\tau_{yz} = 10\text{MPa}$, $\tau_{xz} = 30\text{MPa}$ If $E=250\text{ GPa}$ and $G= 80\text{ GPa}$. Find out the corresponding strain components from Hook's Law. L3 12M

UNIT-II

- 3 a Check whether the following Where C = constant

$$\phi = \frac{q}{8c^3} [x^2(y^3 - 3c^2y + 2c^3)] - \frac{1}{5}y^3(y^2 - 2c^2)$$

L1 6M

- b What is plane strain? Explain it. L4 6M

OR

- 4 Investigate what problem is solved by the stress function.

$$\phi = \frac{P}{2\pi} \left[X^2 + Y^2 \text{Arctan} \left(\frac{Y}{X} \right) - XY \right]$$

L1 12M

UNIT-III

- 5 Derive the differential equilibrium equation in polar coordinates for two dimensional elastic bodies. L2 12M

OR

- 6 Explain generalized solution of the two-dimensional problem in polar coordinates L2 12M

UNIT-IV

- 7 Derive the equation of equilibrium for 3-D stress state. L6 12M

OR

- 8 a Derive the equations of equilibrium in terms of displacements. L2 6M
 b Explain the term uniqueness of solution. L1 6M

UNIT-V

- 9 Derive an expression for torsion of a bar of narrow rectangular cross section. L2 12M

OR

- 10 Explain and derive the equation for the Prandtl's membrane analogy. L2 12M

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