O.P.Code: 20CE1002	R20	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
M.Tech I Year I Semester Regular & Supplementary Examinations February-2025
ADVANCED SOLID MECHANICS
(Structural Engineering)

Time: 3 Hours **Max. Marks: 60**

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

UNIT-I

1	a	Derive the differential equation of equilibrium in terms of displacement components for plane stress problem in the presence of body forces.	**CO4**	**L2**	**6M**
	b	Explain plane stress and plane strain with examples.	**CO4**	**L2**	**6M**

OR

2		List the six components of strain. Derive the strain components between the same for the different planes.	**CO4**	**L3**	**12M**

UNIT-II

3		Determine the stress components and sketch their variation in a region included y=o,y=d and x= 0 on the side is positive. For the given stress function: $\Phi = \frac{-F}{d^3} xy^2 (3d - 2y)$	**CO1**	**L2**	**12M**

OR

4		A cantilever of length 'L' and depth 2C is of unit thickness. A force of P is applied at the free end. The upper and the lower edges are free from load. Obtain the equation of deflection curve of the beam in the form Where X is the distance from free end. $(V)_{Y=0} = \frac{PX^3}{6EI} - \frac{PL^2X}{2EI} + \frac{PL^3}{3EI}$	**CO3**	**L3**	**12M**

UNIT-III

5		Derive the stress components of a plate with circular hole subjected to uniaxial load.	**L2**	**CO1**	**12M**

OR

6		Explain generalized solution of the two-dimensional problem in polar coordinates.	**L2**	**CO1**	**12M**

UNIT-IV

7	Determine the principal stress tensor at a point in a material if the strain tensor at a point is given below And Poisson's ratio 0.3. Define stress invariants also. $\begin{bmatrix} +600 & -200 & +300 \\ -200 & +200 & +450 \\ +300 & -450 & -400 \end{bmatrix} \times 10^{-6}$ $E = 2 \times 10^5$ N/mm^2	**L2**	**CO2**	**12M**

OR

8	What are the stress invariants? Derive expression for the stress invariants. The state of stress in given at a point by following matrix. Determine principle stresses and principle directions. $\begin{bmatrix} 9 & 6 & 3 \\ 6 & 5 & 2 \\ 3 & 2 & 4 \end{bmatrix}$	**CO2**	**L2**	**12M**

UNIT-V

9	Explain and derive the equation for the Prandtle's membrane analogy	**CO5**	**L2**	**12M**

OR

10	Explain the membrane analogy, applied to a narrow rectangular section.	**CO5**	**L2**	**12M**

***** END *****