Q.P. Code: 19CE1002 **R19**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

M.Tech I Year I Semester Regular Examinations Jan 2020

ADVANCED SOLID MECHANICS

(Structural Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	Explain plane stress and plane strain with examples.	**6M**
	b	What is Airy's stress function? Discuss the application of stress function approach for solving two dimensional bending problems.	**6M**
		OR	
2	**a**	Obtain the compatibility equation for plane stress problem in Cartesian form.	**6M**
	b	Explain about components of strain at a point.	**6M**

UNIT-II

3	**a**	For a 2-D elastic body, show that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)(\sigma_x+\sigma_y)=0$.	**7M**
	b	Explain saint- venant's principle with example.	**5M**
		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 lower edges are free from load. Obtain the equation of deflection curve of the beam in the form $(V)_{y=0}=\frac{Px^3}{6EI}-\frac{PL^2x}{2EI}+\frac{PL^3}{3EI}$ Where x is the distance from free end.	**12M**

UNIT-III

5		Starting from a suitable stress function for an axially symmetric problem, derive lame's expressions for radial and hoop stresses in a thick cylinder subjected to internal fluid pressure 'p_i' and external pressure 'p_o'.	**12M**
		OR	
6		Derive the stress components of a plate with circular hole subjected to uniaxial load.	**12M**

UNIT-IV

7	**a**	Derive the equations of equilibrium in terms of displacements.	**6M**
	b	What is meant by homogeneous deformation? Explain with examples.	**6M**
		OR	
8		The stress tensor at a point in a given material is shown below. $\begin{bmatrix} 9 & 6 & 3 \\ 6 & 5 & 2 \\ 3 & 2 & 4 \end{bmatrix}$ Determine the principal stresses and principal directions?	**12M**

UNIT-V

9		A rectangular beam of width '2a' and depth '2b' is subjected to torsion. Derive the equation for obtaining maximum shear stress.	**12M**
		OR	
10		Derive an expression for torsion of a bar of narrow rectangular cross section.	**12M**

*** END ***