O.P.Code: 20CE0164	R20	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester Regular & Supplementary Examinations December-2023
MECHANICS OF SOLIDS
(Common to ME & AGE)

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

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

UNIT-I

1	a	Define stress and strain and explain their types.	CO1	L1	6M
	b	Explain maximum shear strain energy theory.	CO1	L2	6M

OR

2		A brass bar, having cross-sectional area of 1000 mm^2, is subjected to axial forces as shown in figure. Find the total elongation of the bar.Take E=1.05x105 N/mm^2.	CO1	L3	12M

UNIT-II

3		Simply supported beam of length 9 m carries a uniformly increasing load of 900 N/m at one end to 1800 N/m run at the other end. Draw SFD and BMD for the beam. And also calculate the position and magnitude of maximum bending moment.	CO2	L3	12M

OR

4	a	Derive the simple bending equation.	CO2	L2	6M
	b	A beam is simply supported and carries a uniformly distributed load of 40 KN/m run over the whole span. The section of the hewn is rectangular having depth as 500 mm. If the maximum stress in the material of the beam is 120 $N/mm^2$and moment of inertia of the section is 7 x 10^8 mm^4, find the span of the beam.	CO2	L3	6M

UNIT-III

5	a	Derive section modulus for rectangular section.	CO2	L2	4M
	b	A beam 500 mm deep of a symmetrical section has I = 1 x 10^8 mm^4 andis simply supported over a span of 10 m. Calculate: (i) The uniformly distributed load it may carry if the maximum bending stress is not to exceed150 N/mm^2. (ii) The bending stress if the beam carries a central point load of 25 KN.	CO2	L3	8M

OR

6		Draw the shear stress distribution across: (i) Rectangular section. (ii) Triangular section. (iii) Circular section. (iv) I & T Sections	CO3	L2	12M

UNIT-IV

7		A hollow shaft, having an inside diameter 60% of its outer diameter, is to replace a solid shaft transmitting the same power at the same speed. Calculate the percentage saving in material, if the material to be used is also the same.	CO4	L2	12M

OR

8		Using Euler's formula, calculate the critical stresses for a series of struts having slenderness ratio of 40, 80, 120, 160 and 200 under the following conditions : (i) Both ends hinged and (ii) Both ends fixed. Take E = 2.05 x 105 N/ mm2	CO4	L3	12M

UNIT-V

9		Derive an expression for hoop and radial stresses across thickness of the thick cylinder.	CO5	L2	12M

OR

10	a	A cylinder of thickness 1.5cm has to withstand maximum internal pressure of 1.5N/mm2. If the ultimate tensile stress in the material of the cylinder is 300N/mm2, factor of safety 3.0 and joint efficiency 80%, determine the diameter of the cylinder.	CO5	L3	6M
	b	A spherical shell of internal diameter 0.9m and of thickness 10mm is subjected to an internal pressure of 1.4 N/mm2. Determine the increase in diameter and increase in volume. Take E=2X105 N/mm2 and μ=1/3.	CO5	L3	6M

***** END *****