

**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, June - 2024

MECHANICS OF SOLIDS

(ME)

Time: 3 hours

Max. Marks: 70

**Answer ONE Question from each Unit
All Questions Carry Equal Marks**

Q. No.	Question	BTL	CO	Marks
UNIT – I				
1.	a) Draw stress - strain diagram for any ductile material. Indicate salient points and define them.	K2	CO1	7M
	b) A metallic rod of 1 cm diameter, when tested under an axial pull of 10 kN was found to reduce its diameter by 0.0003 cm. The modulus of rigidity for the rod is 51 kN/mm ² . Find the Poisson's ratio, modulus of elasticity and Bulk Modulus.	K3	CO1	7M
OR				
2.	a) Explain about impact and shock loadings.	K2	CO1	7M
	b) Deduce the total extension of a uniformly tapering rod of diameters d and D over a length of L, when the rod is subjected to an axial load P.	K2	CO1	7M
UNIT – II				
3.	a) A simply supported beam of length 8 m rests on supports 6 m apart, the right hand end is overhanging by 2 m. The beam carries a uniformly distributed load of 1500N/m over the entire length. Draw S.F. and B.M diagrams and find the point of contraflexure, if any.	K3	CO2	14M
OR				
4.	a) Draw BMD and SFD for cantilever beam subjected to concentrated load at end.	K2	CO2	7M
	b) A cantilever beam of 2 m long carries a uniformly distributed load of 1.5 kN/m over a length of 1.6 m from the free end. Draw shear force and bending moment diagrams for the beam.	K3	CO2	7M
UNIT – III				
5.	a) Derive the stress distribution for circular section & plot shear stress distribution.	K2	CO3	9M
	b) What are the assumptions of simple bending?	K2	CO3	5M
OR				
6.	a) Obtain the shear stress distribution for a rectangular cross section 230X40mm subjected to a shear force of 40KN. Calculate the maximum and average shear stress.	K3	CO3	7M
	b) Derive the Bending equation from first principle.	K2	CO3	7M

UNIT – IV					
7.	a)	Find the expression for the slope and deflection of a cantilever of length L which carries a uniformly distributed load over a length 'a' from the fixed end by double integration method.	K2	CO4	7M
	b)	A cantilever of length 3 m carries a uniformly distributed load of 15kN/m over a length of 2 m from the free end. If $I = 10^8 \text{ mm}^4$ and $E = 2 \times 10^5 \text{ N/mm}^2$, find: (i) Slope at the free end and (ii) Deflection at the free end.	K3	CO4	7M
OR					
8.	a)	A beam 7m long carries a uniformly distributed load of 20 kN/m run throughout its length. The beam is supported over a span of 5m with overhang of 2m one side. Determine the slope and deflection at the cantilever end $E = 200 \text{ GPa}$, $I = 802 \text{ mm}^4$.	K3	CO4	7M
	b)	Determine maximum deflection for simply supported beam under gradually increasing load	K2	CO4	7M
UNIT – V					
9.	a)	Differentiate between thin and thick cylinders.	K2	CO5	5M
	b)	Derive formulae for longitudinal and circumferential stresses of thin cylinder.	K2	CO5	9M
OR					
10.	a)	Explain the limitations of Euler's formula.	K2	CO5	5M
	b)	Find the thickness of metal necessary for a cylindrical shell of internal diameter 160 mm to withstand an internal pressure of 8.5 N/mm^2 . The maximum hoop stress in the section is not to exceed 35 N/mm^2 .	K3	CO5	9M