Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Third Semester

Chemical Engineering

CH3302 - Mechanics of Solids

Regulations - 2021

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	State Hooke's Law.	L1	1	2
2.	What is Poisson's Ratio, and how does it relate to strain?	L2	1	2
3.	Define shear force and bending moment.	L1	2	2
4.	Identify the types of beams and tell how each type responds to transverse loading?	L2	2	2
5.	List the methods used for calculating deflections in beams.	L1	3	2
6.	Examine the relationship between load intensity and deflection in beams.	L4	3	2
7.	Specify the assumptions of Simple Bending Theory.	L2	4	2
8.	Define flitched beams.	L1	4	2
9.	Tell torsion significance in the context of circular shafts.	L1	5	2
10.	Give the details in Euler's theory of long columns.	L3	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	A beam fixed at one end and supported at the other end is subjected to a concentrated load P at its center. The beam has a cross-sectional area of 40 mm^2, a length of 1.5 m and a Young's modulus of 200 GPa. i. Determine the bending stress induced in the beam at the center due to the load P. ii. Calculate the deflection at the center of the beam. iii. Discuss the conditions needed to maintain stability and equilibrium for the beam under this load.	L2	1	16
		Or			
	b	A bar of 25 mm diameter is subjected to a load(pull) of 40kN. The measured extension on gauge length of 200 mm is 0.085 mm and	L2	1	16

		the change in diameter is 0.003 mm. Find the values of poisson's ratio and three moduli.			
12.	a	A cantilever beam 1.5-meter-long, fixed at A is carrying paint loads of 1000 kg at B, C and D each and at distances of 0.5-meter, 1.0 meter and 1.5 meter from the fixed end. Calculate the shear force and bending moments at salient points.	L4	2	16
		Or			
	b	Classify beams based on their support conditions and types of transverse loading.	L3	2	16
13.	a	Explain the significance of boundary conditions when applying the double integration method for beam deflection. Provide an example with a simply supported beam.	L2	3	16
		Or			
	b	A simply supported beam of length L = 6 is subjected to a point load P=10 kN at the center. Calculate the maximum deflection at the center of the beam using the moment area theorem. Assume E=200 GPa, E = 200GPa and $I=80\times10^{-6}$.	EV	3	16
14.	a	Consider a simply supported beam with a span of 6 m, carrying a point load of 20 kN at the center. Analyze the shear force and bending moment diagrams for the beam and determine the maximum shear stress using the formula $\tau=VQ/Ib$, where Q is the first moment of area.	L4	4	16
		Or			
	b	Explain the process of analyzing stresses in beams. What factors must be considered?	L2	4	16
15.	a	Analyze the effect of eccentricity on a column subjected to axial load. A column with a rectangular cross-section is subjected to a load with an eccentricity of 50 mm. Calculate the maximum bending stress and the resultant stress in the column.	L4	5	16
		Or			
	b	An open coil helical spring made of 10mm diameter wire and of mean diameter 10 cm has 12 coils, angle of helix being 15 degrees. Determine the axial deflection and the intensities of bending and shear stress under a load of 500 N. Take C as 80 kN/mm2 and E = 200 kN/mm2.	L3	5	16