Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026

Fourth Semester

Mechanical Engineering

CE3491- STRENGTH OF MATERIALS

Regulations - 2021

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

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

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Define stress and strain.	L1	1	2
2.	What are principal planes and principal stresses?	L1	1	2
3.	Differentiate between shear force and bending moment.	L2	2	2
4.	Explain the concept of neutral axis in beam bending.	L2	2	2
5.	State the torsion equation for a solid circular shaft.	L1	3	2
6.	What is the difference between open and closed coiled springs?	L2	3	2
7.	What is the significance of slope and deflection in beams?	L2	4	2
8.	Define the term 'elastic curve' in the context of beam deflection.	L1	4	2
9.	Differentiate between thin and thick cylinders.	L2	5	2
10.	What is Lame's theory in thick-walled cylinders?	L1	5	2

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

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Explain the relationship between stress and strain using a stress-strain diagram.	L2	1	8
		ii	Describe Mohr's Circle and its significance in stress analysis.	L4	1	8
			Or			
	b	i	Calculate the principal stresses and principal planes for a given 2D stress system.	L3	1	8
		ii	Discuss the significance of volumetric strain in materials under stress.	L2	1	8
12.	a	i	Derive the bending equation for a simply supported beam subjected to a uniform load.	L3	2	8
		ii	Explain the distribution of shear stress across a rectangular cross-section of a beam.	L4	2	8
			Or			
	b	i	Analyze a cantilever beam subjected to a point load at its free end. Calculate the maximum bending moment.	L4	2	8
		ii	Discuss the concept of flitched beams and their applications.	L2	2	8
13.	a	i	Derive the torsion equation for a solid circular shaft.	L3	3	8
		ii	Explain the behavior of helical springs under axial loads.	L2	3	8
			Or			
	b	i	Determine the power transmitted by a shaft subjected to combined bending and torsion.	L3	3	8
		ii	Explain the differences between series and parallel arrangement of shafts in torsion.	L2	3	8

14.	a	i	Calculate the slope and deflection of a simply supported beam using the double integration method.	L3	4	8
		ii	Explain the conjugate beam method for calculating deflection.	L2	4	8
			Or			
	b	i	Determine the deflection of an overhanging beam subjected to a uniform load.	L4	4	8
		ii	Discuss the Macaulay's method for computing deflection in beams.	L2	4	8
15.	a	i	Derive the formula for circumferential and longitudinal stresses in thin cylindrical shells subjected to internal pressure.	L3	5	8
		ii	Explain Lame's equation for thick-walled cylinders and its applications.	L2	5	8
			Or			
	b	i	Analyze a thick cylinder under internal pressure using Lame's theory.	L4	5	8
		ii	Discuss the deformation in spherical shells under internal pressure.	L2	5	8