Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

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

Fourth Semester

Civil Engineering

CE3402 - 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.	Write the relationship between Young's modulus, Bulk modulus and Shear modulus.	L2	1	2
2.	What is the pole of a Mohr's circle?	L1	1	2
3.	How do you describe a beam?	L1	2	2
4.	Write the theory of bending equation.	L2	2	2
5.	What are the disadvantages of double integration method?	L1	3	2
6.	How the conjugate beam method is used to find the deflection?	L2	3	2
7.	Enumerate the advantages of fixed beams.	L2	4	2
8.	State the theorem of three moment equation.	L1	4	2
9.	When does unsymmetrical bending occur?	L1	5	2
10.	Enumerate the theories of failure.	L2	5	2

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

Q.No		Questions	BLT	CO	Marks
11.	a	A compound bar of length 600 mm consists of a strip of aluminium 40 mm wide and 20 mm thick and a strip of steel 60 mm wide × 15 mm thick rigidly joined at the ends. If elastic modulus of aluminium and steel are 1×10^5 N/mm^2 and 2×10^5 N/mm^2 , determine the stresses developed in each material and the extension of the compound bar when axial tensile force of 60 kN acts.	L1	1	16
		Or			
	b	A solid steel shaft has to transmit 100 kW at 160 r.p.m. Taking allowable shear stress as 70 MPa, find the suitable diameter of the shaft. The maximum torque transmitted in each revolution exceeds the mean by 20%.	L1	1	16
12.	a	A 6m long cantilever beam carries loads of 5kN, 8kN and 15kN at 1m, 2.5m and 5m respectively from the free end and a uniformly distributed load of 15kN/m over a length of 4m from the fixed end. Draw the shear force and bending moment diagrams for the beam.	L2	2	16
		Or			
	b	A rectangular beam, simply supported over a span of 4m, is carrying a UDL of 50 kN/m. Find the dimensions of the beam, if the depth is 2.5 times its width. Take maximum bending stress in the beam section as 60 Mpa.	L2	2	16
13.	a	A beam of length 6 m is simply supported at its ends and carries two point loads of 48 kN and 40 kN at a distance of 1 m and 3 m respectively from the left support. Find deflection under the 48 kN load by Macaulay's method. Let $E = 2 \times 10^5$ N/mm^2 and $I = 85 \times 10^6$ mm^4.	L3	3	16
		Or			
	b	A cantilever of length 2 m carries a point load of 20 kN at the free end and another load of 20 kN at its centre. If $E = 10^5$ N/mm^2 and $I = 10^8$ mm^4 for the cantilever, determine by moment area method, the slope and deflection of the cantilever at the free end.	L3	3	16

14.	a	A propped cantilever of span 6 m is subjected to a UDL of 3 kN/m over a length of 5 m from the fixed end. Find the prop reaction and draw the SFD and BMD.	L2	4	16
		Or			
	b	A continuous beam ABCD of length 15 m rests on four supports covering 3 equal spans and carries a uniformly distributed load 1.5 kN/m length. Calculate the moments and reactions at the supports. Draw the S.F. and B.M. diagrams also.	L2	4	16
15.	a	Find the thickness of a metal necessary for a cylindrical shell of internal diameter 160 mm to withstand an internal pressure of 8 N/mm^2. The maximum hoop stress in the section is not to exceed 35 N/mm^2.	L5	5	16
		Or			
	b	A shear force of 100 kN and a sagging moment of 80 kN-m act at a certain cross-section of rectangular beam 100 mm wide and 200 mm deep. Compute the principal stresses at a point 30 mm below the top surface.	L5	5	16

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