Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Fourth Semester

Civil Engineering

CE3402 – Strength of Materials

Regulations - 2021

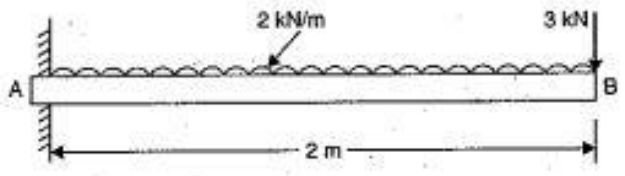
Duration : 3 Hrs *Maximum : 100 Marks*

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

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	State Hooke's law .	RE	1	2
2.	What is Mohr's circle?	RE	1	2
3.	What are the different types of beams?	RE	2	2
4.	Recall the theory of bending equation.	RE	2	2
5.	State the two theorems in moment area method.	RE	3	2
6.	Draw conjugate beam for a cantilever beam fixed at the left end.	UN	3	2
7.	State "degree of static indeterminacy".	RE	4	2
8.	Assess the degree of indeterminacy for a) propped cantilever b) fixed beam c) continuous beam?	EV	4	2
9.	Write the shear centre equation for channel section.	RE	5	2
10.	State maximum strain energy theory or Haigh"s theory.	RE	5	2

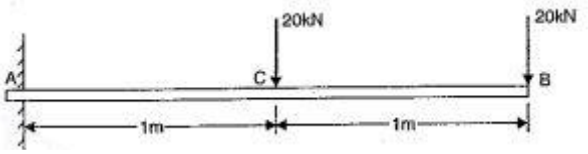
*PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	A bar of 25 mm diameter is subjected to a pull of 40 kN. The measured extension on gauge length of 200 mm is 0.085 mm and the change in diameter is 0.003 mm. Estimate the values of poisson's ratio and the three moduli.	EV	1	13
		Or			
	b	A rectangular block of material is subjected to a tensile stress of 110 N/mm^2 on one plane and a tensile of 47 N/mm^2 on a plane at right angles to the former. Each of the above stresses is accompanies by a shear stress of 63 N/mm^2. Determine the principal stresses, principal planes and the maximum shear stresses.	EV	1	13
12.	a	Figure out the SF and BM for the beam shown.	AP	2	13



Or

	b	A simply supported beam of span 6 m is subjected to a UDL of 15 kN/m over its entire length. The cross section of beam is 20 cm wide and 30 cm deep. Sketch the variation of bending stress and shear stress in the beam cross section.	AP	2	13
13.	a	Solve for the deflection of the beam shown below by moment area method.	AP	3	13



Or

	b	A beam of length 5 m is simply supported at its ends and carries two point loads of 47 kN and 30 kN at a distance of 1.1 m and 3.2 m respectively from the left support. Find (i) Deflection under each load (ii) Maximum deflection (iii) Slope at the end A Take $I=85\times10^6$ mm^4 $E = 2\times10^5$ N/mm^2	AP	3	13
14.	a	A fixed beam AB of span 4.5 m carries a point load of 80 kN at its mid span and a uniformly distributed load of 15 kN/m throughout its length. Investigate (i) Fixed End Moments (ii) Reactions. Also draw the SFD and BMD.	AN	4	13

Or

	b	Construct a continuous beam ABC by three moment equation, fixed at its ends A and C and simply supported at support B. Span AB of length 6 m carries UDL of 2 kN/m of its full length. Span BC of length 6 m carries a point load of 12 kN at the centre of the span. Draw its SFD and BMD.	AP	4	13
15.	a	A beam of rectangular cross section is subjected to pure bending with a moment of 20 kN.m. The trace of the plane of loading is inclined at 45^0 to the YY axis of the section. Identify the N.A of the section and calculate the bending stress induced at each corner of the beam section.	AP	5	13

Or

	b	A cylindrical shell made of mild steel plate and 1.2 m in diameter is to be subjected to an internal pressure of 1.5 MN/m^2. If the material yields at 200 MN/m^2, find the thickness of the plate on the basis of the following three theories. Assuming factor of safety 3 in each case. (i) maximum principal stress theory (ii) maximum shear stress theory (iii)maximum shear strain energy theory	AP	5	13

*PART – C (Marks 1*15 = 15)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
16.	a	A cylindrical shell 3.25 m long, 1m in diameter is subjected to an internal pressure of 1 N/mm^2. If the thickness of the shell is 10 mm, find the circumferential, and longitudinal stress maximum shear stress and the change in dimensions of the shell. Take $E=2x10^5$ N/mm^2, $\mu=0.3$.	AP	1	15
		Or			
	b	A simply supported beam of 9 m span is as shown in figure given below. Draw the B.M and S.F diagram indicating principal values.	AP	2	15