Register No : ____________________

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

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

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.	L1	1	2
2.	Why hollow circular shafts are preferred when compared to solid circular shafts?	L2	1	2
3.	List the important types of loads acting on beams.	L1	2	2
4.	Mention the assumptions made in the theory of simple bending.	L1	2	2
5.	State moment area theorem.	L1	3	2
6.	Write the advantages of Macaulay's method over integration method.	L2	3	2
7.	Calculate the fixed end moment for the fixed beam subjected to an eccentric point load.	L2	4	2
8.	Write the equation for slope at the support for a simply supported beam of length L, constant EI and carrying central concentrated load.	L2	4	2
9.	Name the stresses set up in a thin cylinder subjected to internal fluid pressure.	L1	5	2
10.	State Lami's theorem.	L1	5	2

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

Q.No		Questions	BLT	CO	Marks
11.	a	The max stress produced by a pull in a bar of length 1 m is 150 N/m^2. The area of Cross sections and length are shown in Fig.1. Calculate the strain energy stored in the bar Assume, E = 2×10^5 N/mm^2.	L3	1	16

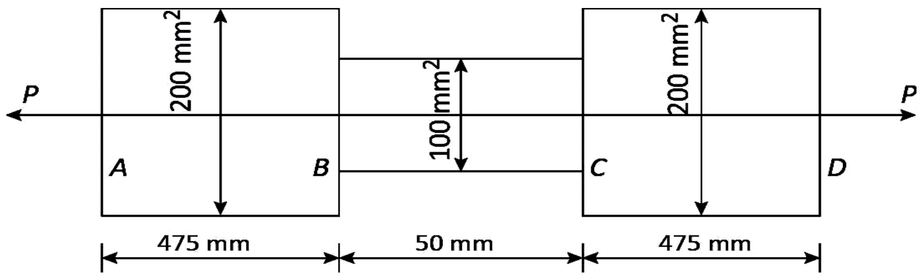

Fig.1

Or

	b	A solid shaft of 250 mm diameter is to be replaced by a hollow steel shaft with internal diameter equal to 0.5D where D is the external diameter. Design the hollow shaft and find out the saving in material. The value of maximum shear stress may be assumed as same for both the shafts of equal length.	L3	1	16
12.	a	Draw the shear force (SF) and bending moment (BM) diagrams for a simply supported beam of length 9 m and carrying a uniformly distributed load of 10 kN/m for a distance of 6 m from the left end. Also calculate the maximum bending moment on the section.	L3	2	16
		Or			
	b	A beam of I section 500 mm deep and 190 mm wide has flanges 25 mm thick and web 15 mm thick. It carries a shearing force of 400 kN at a section. Calculate the maximum intensity of shear stress in the section assuming the moment of inertia to be 6.45×10^8 mm^4. Also calculate the total shear force carried by the web and sketch the shear stress distribution across the section.	L3	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: (i) Deflection under each load; (ii) Maximum deflection; (iii) The point at which the maximum deflection occurs. Take, I = 85×10^6 mm^4, E = 2×10^5 N/mm^2	L3	3	16
		Or			
	b	Using conjugate beam method, determine the slope at the supports and deflection C and D for the beam given in Fig. 2. Assume E = 200 X 10^6 kN/m^2 and I = 300 X 10^{-4} m^4	L3	3	16

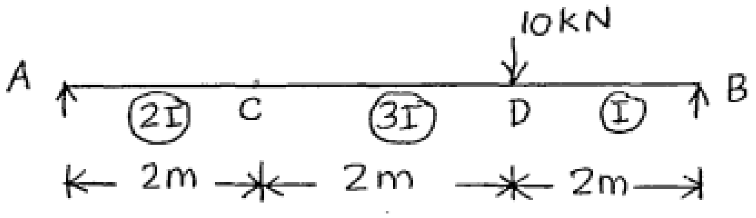

Fig.2

14.	a	A fixed beam of 9m span subjected to two-point loads 200 kN and 300 kN at a distance of 3m and 6m from right end, respectively. Take modulus of elasticity E = 2 $x10^8 kN/m^2$ and moment of inertia I = 10 X 10^8 m^2. Find the maximum deflection in the beam.	L3	4	16
		Or			
	b	A continuous beam ABCD has three spans AB, BC, CD each of length 3m, 6m and 5m respectively. The beam is loaded with uniformly distributed load of intensity 4kN/m, 8kN/m and	L3	4	16

		4kN/m over the spans AB, BC and CD respectively. Draw the bending moment and shear force diagrams for the beam. Take, flexural rigidity EI= 2 x10^8kN/m^2			
15.	a	A thick walled closed – end cylinder is made up of an aluminum alloy has a Young's modulus of 70 GPa and Poisson's ratio as 0.3. It has an internal diameter of 150 mm and outside diameter of 500 mm. The fluid is subjected to an internal fluid pressure of 150 MPa. Determine the principal stresses and maximum shear stress at a point on the inside surface of the cylinder. Also, determine the increase in inside diameter due to fluid pressure.	L4	5	16
		Or			
	b	The principal stress in the wall of a container are 40 MN/m^2 and 80 MN/m^2 Determine the normal, shear and resultant stresses in magnitude and direction in a plane, the normal of which makes and angle of 30^0 with the direction of maximum principal stress.	L4	5	16