Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E. DEGREE END SEMESTER THEORY EXAMINATIONS, APR / MAY 2026

Fourth Semester

Civil Engineering

UCET24402 – STRENGTH OF MATERIALS

Regulations - 2024

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

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

Q.No	Questions	BTL	CO	Marks
1.	Define Poisson's Ratio.	K1	1	2
2.	List any two elastic constants.	K1	1	2
3.	Write down the different types of beam supports.	K1	2	2
4.	What are the assumptions made in theory of simple bending?	K2	2	2
5.	State the two theorems in the moment area method.	K1	3	2
6.	Differentiate actual beam and conjugate beam.	K2	3	2
7.	Why are continuous beams considered as statically indeterminate?	K2	4	2
8.	List the advantages of theorem of three moments.	K1	4	2
9.	Define unsymmetrical bending.	K1	5	2
10.	Why shear centre is important?	K2	5	2

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

Q.No		Questions	BLT	CO	Marks
11.	a	The composite bar, consisting of steel and aluminum components as shown figure 11.a, is connected to two grips at the ends at a temperature of 60^0C. Find the stresses in two rods when the temperature falls to 20^0C, i) if the ends do not yield, ii) If the ends yield by 0.25 mm. Take Es = 2×10^5 N/mm^2 and Ea = 0.7×10^5 N/mm^2, $\alpha_s = 1.17 \times 10^{-5}$ per ^{o}C and $\alpha_a = 2.34 \times 10^{-5}$ per ^{o}C.	K3	1	16

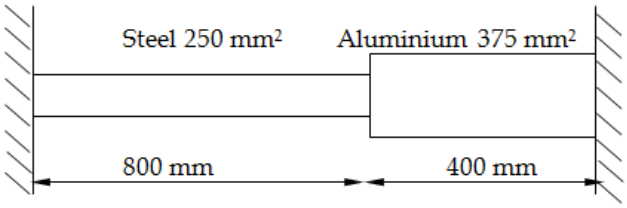

Figure 11.a

Or

	b	A member ABCD is subjected to point loads P_1, P_2, P_3, P_4 as shown in fig 11 b. calculate the force P_2 necessary for equilibrium, if P_1 = 45 kN, P_3 = 450 kN and P_4 = 139 kN. Determine the total elongation of the member, assuming the modulus of elasticity to be 2.1 x 10^5 N/mm^2 .	K3	1	16

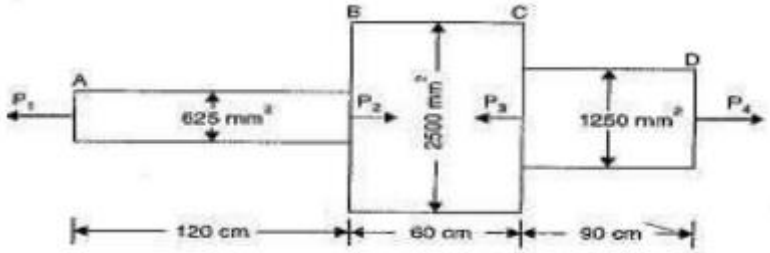

Figure 11.b

12.	a	Draw the shear force and bending moment diagram of the beam shown in Figure 12.a	K3	2	16

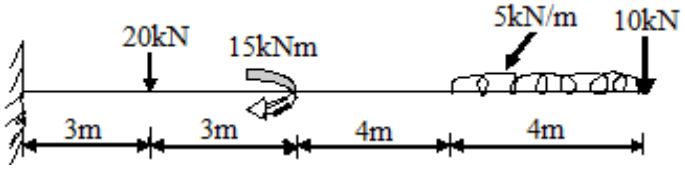

Figure 12.a

Or

	b	The cross section of T beam is as follows: Flange thickness = 10 mm; width of the flange = 100 mm; thickness of the web = 10 mm; depth of the web = 120 mm; If a shear force of 2 kN is acting at a particular section of the beam design and draw the shear stress distribution across the section.	K3	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. Consider $E=2\times10^5$ N/mm^2 and $I = 85\times10^6$ mm^4. Find the deflection under each load and the maximum deflection by using Macaulay's method.	K3	3	16

Or

	b	A simply supported beam of length 5 m carries a point load of 5 kN at a distance of 3 m from left end. If $E = 2 \times 10^5$ N/mm^2 and $I = 1 \times 10^8$ mm^4. Determine the slope at left support and deflection under the point load using Conjugate beam method.	K3	3	16
14.	a	A continuous beam ABC of uniform section with span AB and BC as 6 m each, is fixed at A and C, simply supported at B. The beam is carrying a UDL of 2 kN/m in the span AB, a point load of 12 kN in the mid of span BC. Find the support moments along the beam, draw the shear force and bending moment diagrams.	K3	4	16

Or

	b	A fixed beam AB of length 6 m carries point loads of 160 kN and 120 kN at a distance of 2 m and 4 m from the left end A. Find the fixed end moments and the reactions at the supports. Draw the shear force and bending moment diagrams.	K3	4	16
15.	a	A beam with an unsymmetrical I-section is subjected to a bending moment of 5 kN-m. Determine the position of the neutral axis and calculate the maximum tensile and compressive stresses. The section has the following dimensions: top flange 100 mm × 10 mm, web 10 mm × 180 mm, and bottom flange 60 mm × 10 mm.	K3	5	16

Or

	b	Derive an expression for the shear center of the channel section.	K2	5	16