Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

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

Fourth Semester

Agricultural Engineering

AI3403 - Strength of Materials for Agricultural Engineering

Regulations - 2021

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

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

Q.No	Questions	BLT	CO	Marks
1.	Summarize about Thermal stresses.	L2	1	2
2.	Tell the difference between circumferential stress and longitudinal stress.	L1	1	2
3.	List the assumptions made in finding the forces in a truss.	L1	2	2
4.	Explain the method of the section analysis of plane trusses.	L2	2	2
5.	Interpret the difference between a cantilever beam and a simply supported beam.	L2	3	2
6.	List the assumptions made in the theory of simple bending.	L1	3	2
7.	A solid shaft is to transmit a torque of 25 kN-m. If the shearing stress is not to exceed 60 MPa. Find the minimum diameter of the shaft.	L2	4	2
8.	Show the difference between close-coiled and open-coiled helical springs.	L2	4	2
9.	A cantilever of length 3 m is carrying a point load of 25 kN at the free end. If the moment of inertia of the beam = 10^8 mm^4 and the value of E = 2.1×10^5 N/mm^2, find the deflection at the free end.	L2	5	2
10.	What is the main difference between Macaulay's method and the double integration method?	L1	5	2

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

Q.No		Questions	BLT	CO	Marks
11.	a	A steel rod 5 m long and 30 mm in diameter is subjected to an axial tensile load of 50 kN. Determine the change in length, diameter, and volume of the rod. Take E = 2.1×10^5 N/mm^2 and Poisson's ratio = 0.25.	L3	1	16
		Or			
	b	Calculate the modulus of rigidity and bulk modulus of a cylindrical bar with a diameter of 30 mm and a length of 1.5 m if the longitudinal strain in a bar during tensile stress is four times the lateral strain. Identify the change in volume when the bar is subjected to a hydrostatic pressure of 100 N/mm^2. Take E = 1×10^5 N/mm^2.	L3	1	16

12.	a	Determine the forces by the method of joints in the truss shown in Fig.12. a. It carries a horizontal load of 16 kN and a vertical load of 24 kN.	L5	2	16

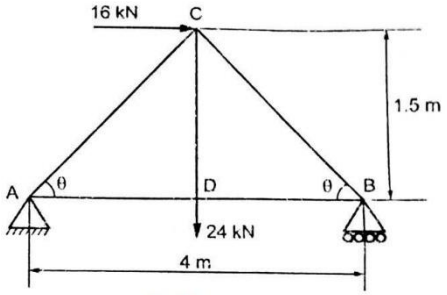

Fig 12. a

Or

	b	A truss of 8 m span consisting of seven members, each 4 m long, supported at its ends and loaded as shown in Fig.12. b. Determine the forces on the members by the tension coefficient method.	L5	2	16

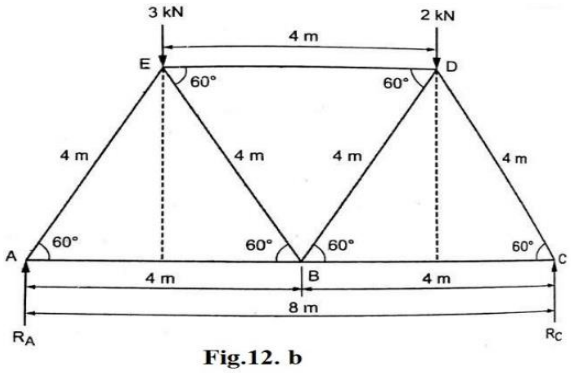

Fig.12. b

13.	a	A simply supported beam of length 6 m carries a point load of 3 kN and 6 kN at a distance of 2 m and 4 m from the left end. Construct the shear force and bending diagrams.	L3	3	16

Or

	b	An I-section beam 350 mm x 200 mm has a web thickness of 12.5 mm and a flange thickness of 25 mm. It carries a shearing force of 200 kN at a section. Identify the shear stress distribution across the section.	L3	3	16
14.	a	A hollow shaft of external diameter 120 mm transmits 300 kW power at 200 r.p.m. Determine the maximum internal diameter if the maximum shear stress in the shaft does not exceed 60 N/mm^2.	L3	4	16

Or

	b	A closely-coiled helical spring is made up of 10 mm diameter steel wire having 10 coils with 80 mm mean diameter. If the spring is subjected to an axial twist of 10 kN-mm, determine the bending stress and increase in the number of turns. Take E as 200 GPa.	L3	4	16
15.	a	A cantilever of length 2 m carries 20 kN at the free end and another load of 20 kN at its center. If E = 10^5 N/mm^2 and I = 10^8 mm^4 for the cantilever. Construct the slope and deflection of the cantilever at the free end using the moment area method.	L3	5	16

Or

b	Determine the slope and deflection at the free end of a cantilever with a length of 3 m, supporting a point load of 10 kN positioned 2 m from the fixed end. Apply the conjugate beam method to solve.	L3	5	16