Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Third Semester

Chemical Engineering

CH3302 / UCHT24302- Mechanics of Solids

Regulations – 2021 & 2024

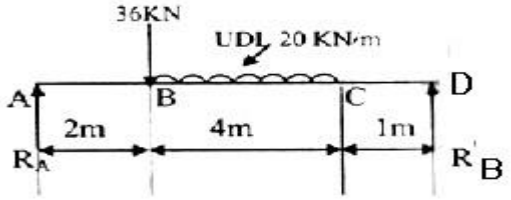
Duration : 3 Hrs *Maximum : 100 Marks*

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

Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	Give the relation for change in length of bar hanging freely under its own weight.	L1	1	2
2.	Determine the Poisson's ratio and bulk modulus of a material for which young's modulus is 1.2 x 10^5 N /$mm^2$and modulus of rigidity is 4.8 x 10^4 N/mm^2.	L2	1	2
3.	Draw the BMD for cantilever beam subjected to an anticlockwise movement at its free end.	L1	2	2
4.	Define the term point of contra flexure.	L1	2	2
5.	Draw the variation of shear stress for a Tee section.	L2	3	2
6.	When do you prefer Moment area method?	L1	3	2
7.	State the theory of simple bending.	L2	4	2
8.	What is the moment of resistance of the section of the beam?	L2	4	2
9.	Recall any two differences between closed coil and open coil helical springs.	L1	5	2
10.	Recollect the term stiffness of the spring.	L2	5	2

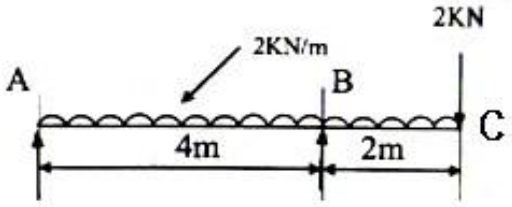
*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Find the young's modulus and Poisson's ratio of a metallic bar of length 300mm, breath 40 mm, depth 40mm when the bar is subjected to an axial load an 40KN.Decrease in length is 0.75mm and the increase in breadth is 0.03mm. Also find the modulus of rigidity of the bar.	L2	1	16
		Or			
	b	A rectangular block material is subjected to a tensile stress of 90N/mm^2 along x-axis and a compressive stress of 45N/mm^2 on a plane at right angle to it, together with shear stresses of 80N/mm^2 on the same plane. Calculate the principle stresses, principal plans and maximum shear stress.	L2	1	16
12.	a	Analysis the simply supported beam shown in figure and sketch the SF and BM diagram.	L3	2	16

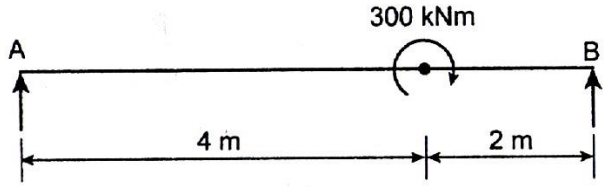


Or

	b	Draw the SF and BM diagrams for the beam shown below find the maximum values and their positions. Give the values at important points in the diagram.	L3	2	16

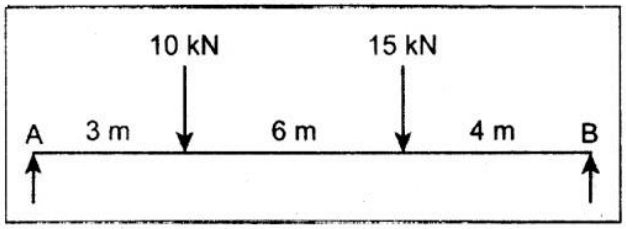


13.	a	Find the maximum deflection of the beam shown in the figure. EI = $1x10^{11}$ KN/m^2. Use macaulay's method.	L4	3	16



Or

	b	A beam is loaded as shown in the figure. Determine the deflection under the load points. Take E=200Gpa and I=160x 10^6mm^4.	L4	3	16



14.	a	A beam of symmetrical section is 300mm deep and has a moment of inertia of 7 x 10^7mm^4 about its principal axis. To what radius May' it be bent if the maximum stress is not to exceed 80 N/mm^2? Take E = 2 $x10^5$ N/mm^2. What would be the moment of resistance at this stress?	L5	4	16
		Or			
	b	Find the dimensions of a timber beam of span 4.38m to carry uniformly distributed load of 20KN/m, if the width is half the depth and permissible bending stress is limited to 9Mpa.	L5	4	16
15.	a	A solid circular shaft transmits 75 KW power at 200 r.p.m. calculate the shaft diameter, if the twist in the shaft is not to exceed 10 in 2 meters length of shaft, and shear stress is limited to 50 N/mm^2. Take modulus of rigidity, C = 1 x 10^5 N/mm^2.	L3	5	16
		Or			
	b	The stiffness of a close – coiled helical spring is 1.5 N/mm of compression under a maximum load of 60 N. The maximum shearing stress produced in the wire of the spring is 125 N / mm^2. The solid length of the spring is given as 5 cm. Determine (i) Diameter of the wire, (ii) Mean diameter of the coils (iii) Number of coils required. Take C = 4.5 x 10^4 N/mm^2	L3	5	16