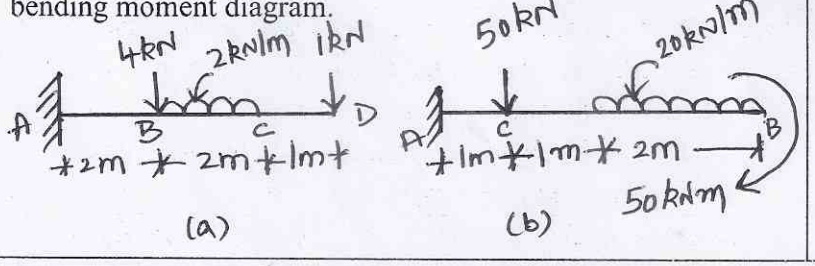
K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
FIRST ASSIGNMENT

Degree	:	**B.E**	**Semester**	:	**III**
Branch	:	**Civil Engineering**	**Course Code**	:	**21CV33**
Course Title	:	**Strength of Materials**	**Max Marks**	:	**10**
Date	:	**24/11/2022**	**Last Date for submission**	:	**5/12/2022**

Q No.	Question	Marks	K-Level	CO mapping
1	**Define** four elastic constants.	1	K1 Remembering	CO1
2	**Derive** an expression for the deformation of a rectangular tapering bar of uniform thickness subjected to axial force.	1	K3 Applying	CO1
3	**Derive** an expression for the deformation of a circular tapering subjected to axial force.	1	K3 Applying	CO1
4	**Determine** the stresses in various segments of circular bar shown in the figure. Also compute total elongation taking Young's modulus E=195 GPa.	1	K3 Applying	CO1
5	A compound bar consists of a 40mm dia. steel bar surrounded by a closely fitting cast iron tube of 4.5mm wall thickness. Length of the compound bar is 1.9m. **Determine** the load required to compress the compound bar so that the deformation induced in it is 1mm. Take E_s=200 GPa and E_{CI}=100 GPa.	1	K3 Applying	CO1
6	**Derive** the relationship between the 3 elastic constants E,G and K.	1	K3 Applying	CO1
7	An elemental cube is subjected to tensile stresses of 30N/mm^2 and 10N/mm^2 acting on two mutually perpendicular planes and a shear stress of 10N/mm^2 on these planes. **Draw** the Mohr's circle of stresses and **determine** the magnitude and directions of principal stresses and also the greatest shear stress.	1	K3 Applying	CO1
8	**Define** (i) shear force (ii) bending moment (iii) point of contra-flexure (iv) shear force diagram (v) bending moment diagram.	1	K1 Remembering	CO2
9	**Derive** the relationship between shear force, bending moment and load intensity.	1	K3 Applying	CO2
10	For the cantilever beams shown below, **draw** shear force and bending moment diagram. 	1	K3 Applying	CO2

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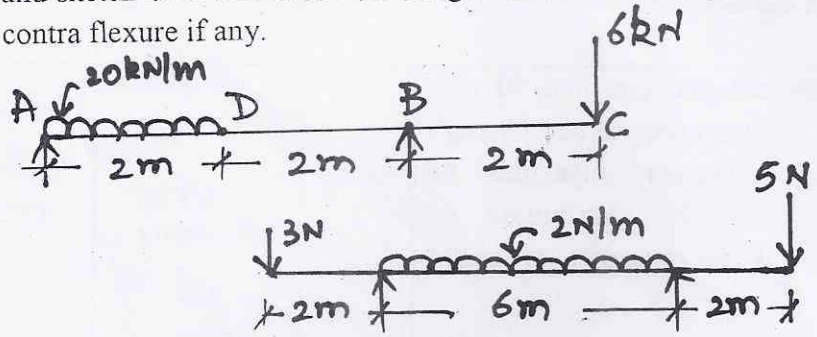
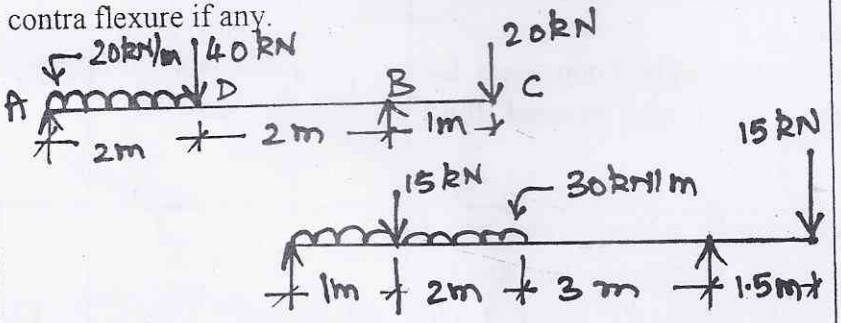
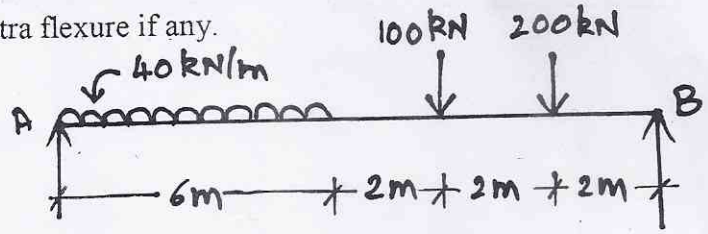
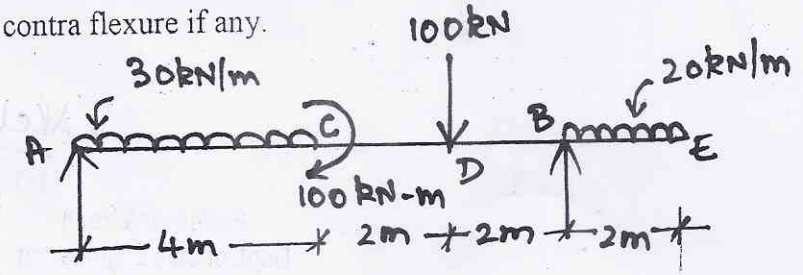
DEPARTMENT OF CIVIL ENGINEERING

SESSION: 2022-2023 (ODD SEMESTER)

SECOND ASSIGNMENT

Degree	: B.E	Semester	: III
Branch	: Civil Engineering	Course Code	: 21CV33
Course Title	: Strength of Materials	Max Marks	: 10
Date	: 02/01/2023	Last Date for submission	: 10/01/2023

Q No.	Question	Marks	K-Level	CO mapping
1	**Calculate** shear force and bending moment at salient points and sketch SFD and BMD for the given beams. Locate point of contra flexure if any. 	1	K3 Applying	CO2
2	**Draw** the SFD and BMD for the given beams. Locate point of contra flexure if any. 	1	K3 Applying	CO2
3	**Calculate** shear force and bending moment at salient points and sketch SFD and BMD for the given beam. Locate point of contra flexure if any. 	1	K3 Applying	CO2
4	**Draw** the SFD and BMD for the given beam. Locate point of contra flexure if any. 	1	K3 Applying	CO2

5	**Derive** the torsion equation for a circular shaft $T/J=\tau/R=G\Theta/L$ with usual notations. Also **list** the assumptions made in the theory of pure torsion.	1	K3 Applying	CO3
6	A solid shaft transmits 250kW at 100 rpm. If the shear stress is not to exceed 75 MPa, what should be the diameter of the shaft? If this shaft is to be replaced by a hollow one whose diameter ratio is 0.6, **determine** the size and percentage saving in weight. The maximum shear stress being the same.	1	K3 Applying	CO3
7	**Compute** the ratio of the weight of solid shaft to that of the hollow shaft of the same material, having the same length to transmit power at a given speed. Take inside diameter of hollow shaft as 0.5 times the outer diameter.	1	K3 Applying	CO3
8	A cast iron pipe has 200mm internal diameter and 50 mm metal thickness and carries water under a pressure of 5 N/mm^2. **Calculate** the maximum and minimum intensities of circumferential stresses and sketch the distribution of circumferential stress intensity and the intensity of radial pressure across the section.	1	K3 Applying	CO3
9	a) For thin cylinders, **derive** the equations for circumferential stress and longitudinal stress. b) **Derive** Lame's equation for the radial and hoop stress for thick cylinder subjected to internal and external fluid pressure.	1	K3 Applying	CO3
10	A thin cylinder is 3m in length, 1m in diameter, and has a metal thickness of 12mm in it walls. **Determine** the stresses (hoop and longitudinal) and strain along the length when subjected to an internal pressure of 1.5 MPa. Take E=210 GPa and μ=0.25.	1	K3 Applying	CO3

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DEPARTMENT OF CIVIL ENGINEERING
SESSION: 2022-2023 (ODD SEMESTER)
THIRD ASSIGNMENT

Degree	:	**B.E**	**Semester**	:	**III**
Branch	:	**Civil Engineering**	**Course Code**	:	**21CV33**
Course Title	:	**Strength of Materials**	**Max Marks**	:	**10**
Date	:	**17/03/2023**	**Last Date for submission**	:	**30/03/2023**

Q No.	Question	Marks	K-Level	CO mapping
1	**Derive** the equation for deformation in a tapering circular bar subjected to an axial force 'P'.	1	K3 Applying	CO4
2	**Derive** an expression for the deformation of a rectangular tapering bar of uniform thickness subjected to an axial force.	1	K3 Applying	CO4
3	With usual notations, **derive** the relationship between Young's modulus and Bulk modulus.	1	K3 Applying	CO4
4	**Derive** the relationship between Young's modulus and Shear modulus with usual notations.	1	K3 Applying	CO4
5	**Explain** (i) Stress (ii) Strain (iii) Modulus of Elasticity (iv) Modulus of Rigidity (v) Bulk Modulus (vi) Volumetric strain (vii) Temperature stresses (viii) Poisson's ratio.	1	K2 Understanding	CO4
6	**Explain** Saint Venant's Principle.	1	K2 Understanding	CO4
7	**Differentiate** between thick and thin cylinders.	1	K2 Understanding	CO5
8	**Derive** an expression for volumetric strain in thin cylinder subjected to internal pressure.	1	K3 Applying	CO5
9	For thin cylinders, **derive** the equations for circumferential stress and longitudinal stress.	1	K3 Applying	CO5
10	**Derive** Lame's equation for the radial and hoop stress for thick cylinder subjected to internal and external fluid pressure.	1	K3 Applying	CO5

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