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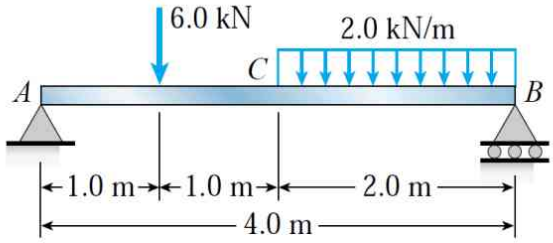
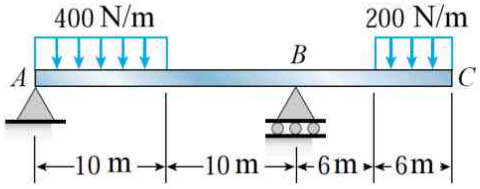
SLOT: C2+TC2

SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST – II
FALL SEMESTER 2023-2024

Programme Name & Branch : **B.Tech. (Mechanical/Automotive)**
Course Code : **BMEE202L**
Course Name : **Mechanics of Solids**
Faculty Name(s) : **DEVENDIRAN S, ASHIRBAD SWAIN, SENTHILNATHAN N, AKASH MOHANTY, MANIKANDAN M**
Class Number(s) : **VL2023240101698/ 1701/ 1702/ 1696/ 1699**
Exam Duration : **90 minutes** **Maximum Marks: 50**

General instruction(s): Answer all the questions. Assume the missing data (if any). Answer to-the-point and tabulate your final results.

Q. No	Question	Marks	CO	BL
1.	Determine the shear force V and bending moment M at the midpoint C of the simple beam AB shown in figure 1.  Fig. No. 1	10	2	5
2.	Determine the shear force V and bending moment M at a cross section located 16 m from the left-hand end A of the beam with an overhang shown in figure 2.  Fig. No. 2	10	2	5
3.	A vertical post 2.5-meters high must support a lateral load P = 12 kN at its upper end (figure 3). Two plans are proposed a solid wood post and a hollow aluminum tube. (a) What is the minimum required diameter d_1 of the wood post if the allowable bending stress in the wood is 15 MPa? (b) What is the minimum required outer diameter d_2 of the aluminum tube if its wall thickness is to be one-eighth of the outer diameter and the allowable bending stress in the aluminum is 50 MPa?	10	3	5

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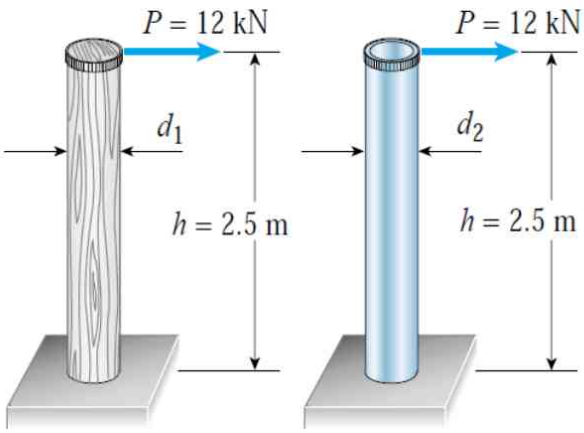
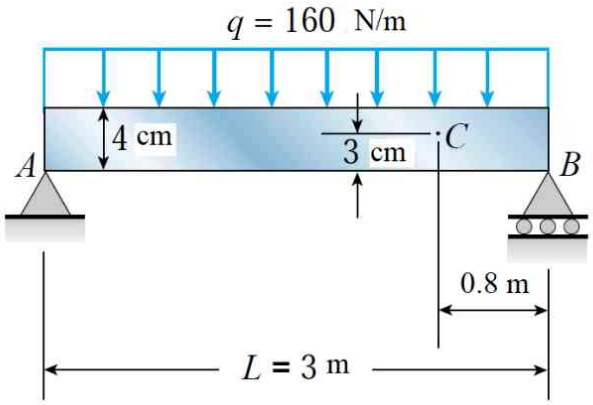
	 (a) Solid wood (b) aluminum tube Fig. No. 3			
4.	A metal beam with span $L = 3$ m is simply supported at points A and B (figure 4. a). The uniform load on the beam (including its own weight) is $q = 160$ N/m. The cross section of the beam is rectangular (Fig. 4.b) with width $b = 10$ mm. and height $h = 40$ mm. The beam is adequately supported against sideways buckling. Determine the normal stress σ_C and shear stress τ_C at point C, which is located 10 mm below the top of the beam and 800 mm from the right-hand support. Show these stresses on a sketch of a stress element at point C.  Fig. No. 4 (a)	10	3	5