
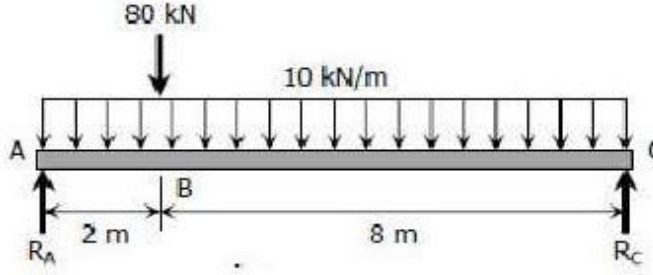
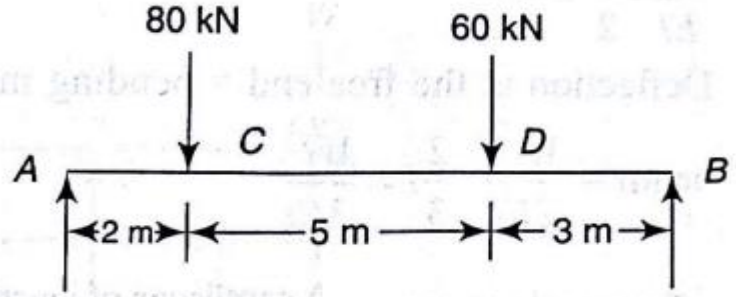
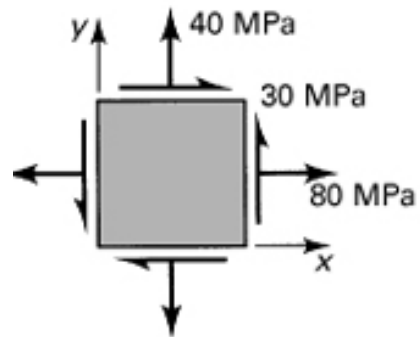


Name:			
Enrolment No:			
UPES End Semester Examination, May 2024			
Course: B Tech (FSE/CE/SE) Program: Strength of material Course Code: MECH 2018		Semester: IV Time : 03 hrs. Max. Marks: 100	
➤ Instructions: Attempt all the sections. Draw neat diagrams. Assume missing data if any. Please use the full three hours wisely.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Choose the correct answer/answers: 1. The neutral axis of the cross-section a beam is that axis at which the bending stress is (A) Zero (B) Minimum (C) Maximum (D) Infinity 2. Principal planes are planes having (A) Maximum shear stress (B) No shear stress (C) Minimum shear stress (D) None of the above 3. After reaching the yielding stage while testing a mild steel specimen, strain (A) Becomes constant (B) Starts decreasing (C) Increases without any increase in load (D) None of the above 4. The torque transmitted by a solid shaft of diameter (D) is (where τ = Maximum allowable shear stress) (A) $\pi /4 \times \tau \times D^3$ (B) $\pi /16 \times \tau \times D^3$ (C) $\pi /32 \times \tau \times D^3$ (D) $\pi /64 \times \tau \times D^3$	4	CO1
Q 2	A simply supported beam of length 6 m, carries point load of 3 kN and 6 kN at distances of 2 m and 4 m from the left end. Find the support reactions.	4	CO1
Q 3	Briefly explain the knowledge you gain during material testing lab. Which experiment do you like most?	3+1	CO1

Q 4	Write a few applications of this subject “strength of material” in your specific branch of engineering.	4	CO1
Q 5	Explain stress strain behavior concepts for ductile material under tensile loading.	4	CO1
SECTION B (4Qx10M= 40 Marks)			
Q 6	A boiler shell 200 cm diameter and plate thickness 1.5 cm is subjected to internal pressure of 1.5 MN/m ² . Calculate hoop stress and longitudinal stress.	5+5	CO4
Q 7	 <p>Calculate support reactions at point A and C.</p>	5+5	CO2
Q 8	A solid steel shaft 6 m long is stressed at 80 MPa when twisted through 3°. Using $G = 80 \text{ GPa}$, compute the shaft diameter. What power can be transmitted by the shaft at 20 Hz?	5+5	CO3
Q 9	A cantilever of length 2.5m carries a uniformly distributed load of 16.4 kN per meter length over the entire length. If the moment of inertia of the beam = $7.95 \times 10^2 \text{ mm}^4$ and value of $E = 2 \times 10^5 \text{ n/mm}^2$, determine the slop and deflection at the free end.	5+5	CO3
SECTION-C (2Qx20M=40 Marks)			
Q 10	Find the support reactions, draw the shear force and bending moment diagrams for the following beam loading: 	4+8+8	CO2
Q 11	At a point in the structural member, the stresses are represented as shown in the figure.	8+6+6	CO4



Use graphical method (Mohr's Circle method) to find out following:

- a. Draw the complete Mohr's circle, labeling critical points.
- b. Draw the complete principal stress element.
- c. Draw the maximum shear stress element