



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SLOT: A2+TA2

REG. NO.:

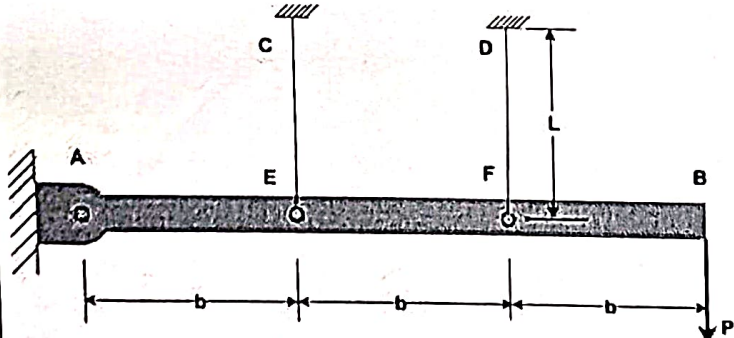
SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech & Mechanical Engineering
Course Code : BMEE202L
Course Name : Mechanics of Solids
Faculty Name(s) : Dr. Rajesh M, Dr. Akash Mohanty,
Dr. Deepak Kumar Biswal, Dr. Rahul Singh Sikarwar,
Dr. Seenuvasaperumal P, Dr. Senthilnathan N
Class Number(s) : VL2025260102082, VL2025260102083
VL2025260102091, VL2025260102080,
VL2025260102084, VL2025260102089
Date of Examination : 17-Aug-25
Exam Duration : 90 minutes
Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcome Statements:

CO 1: Analyse stresses and strains in simple and compound bars, the importance of principal stresses, principal planes and failure theories

Q. No	Question	M	CO	BL
1.	A horizontal bar AB, assumed to be rigid, is supported by two identical wires CE and DF. If each wire has cross sectional area A, determine the tensile stresses acting in wires.  Figure 1	10	1	3



**SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026**

2.	A steel pipe of length $L = 1.22$ m, outside and inside diameters are 152.4 mm and 114.3 mm respectively, is subjected to an axial compressive force of $P = 622.8$ kN. The material properties are: modulus of elasticity $E = 207$ GPa and Poisson's ratio $\nu = 0.30$. Determine the following: (a) The axial shortening (b) The lateral strain (c) The increase in the outer diameter and in the inner diameter (d) The increase in the wall thickness	10	1	3
3.	A steel rod of 20 mm diameter is placed concentrically inside a copper tube with an external diameter of 50 mm and internal diameter of 40 mm. The composite assembly is held between two rigid plates at the ends (assumed to have negligible thickness), and the nuts are tightened just enough to eliminate any initial gap—without inducing preload. If the temperature of the entire assembly is increased by 50°C , determine the <u>thermal stresses</u> developed in both the steel rod and the copper tube. Take Young's modulus of Steel and copper is 200 GPa, and 100 GPa respectively and a thermal expansion coefficient for steel and aluminium is 12×10^{-6} per $^\circ\text{C}$, and 18×10^{-6} per $^\circ\text{C}$	10	1	3
4.	An element under plane stress is subjected to a compressive stress of 50 MPa in the x-direction, a tensile stress of 10 MPa in the y-direction, and a shear stress of -40 MPa. Determine the <u>principal stresses</u> , maximum shear stress, and the orientations of the corresponding planes	10	1	3
5.	Determine the stresses acting on an element rotated 45° anticlockwise using Mohr's circle. Use the necessary data provided in Problem No. 4	10	1	4
