SLOT: A1+TA1

REG. NO.: 24BME0211

VIT
Vellore Institute of Technology

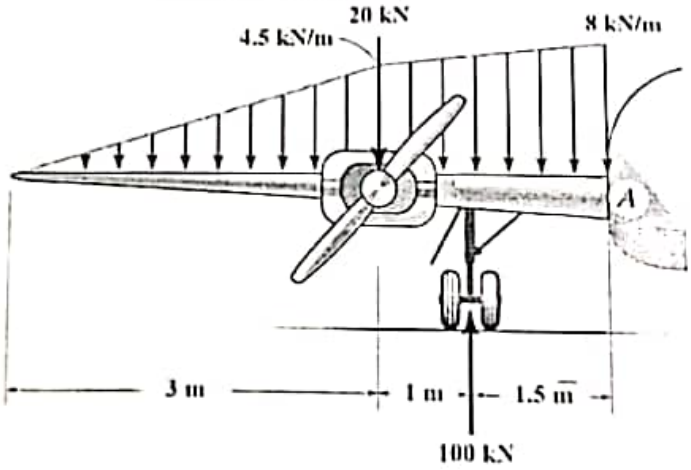
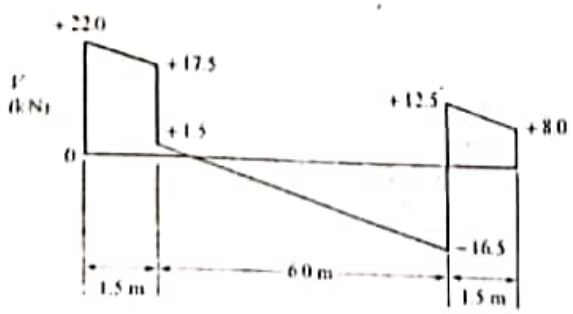
SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

Programme Name & Branch	: B.Tech (Mechanical Engineering)
Course Code	: BMEE202L
Course Name	: Mechanics of Solids
Faculty Name(s)	: VELU M, SRIDHARAN K , MALLIKARJUNA REDDY D, EDWIN SUDHAGAR P , MURUGAN M
Class Number(s)	: VL2025260102088, 2078, 2090, 2081, 2076
Date of Examination	: 5-10-2025
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 2: Illustrate the relationship among load, shear force and bending moment for various beams
  CO 3: Evaluate the bending and shear stresses for beams with varying cross sections

Q. No	Question	M	CO	BL
1.	The loading on an aircraft wing is idealised as shown in Fig. 1. Draw the shear-force and bending-moment diagrams for the wing, assuming it a cantilever beam with the end *A* fixed.  Fig. 1	10	CO2	BL3
2.	The shear-force diagram for a beam is shown in the Fig. 2. Assuming that no couples act as loads on the beam, determine the forces acting on the beam and draw the bending-moment diagram.  Fig. 2	10	CO2	BL4

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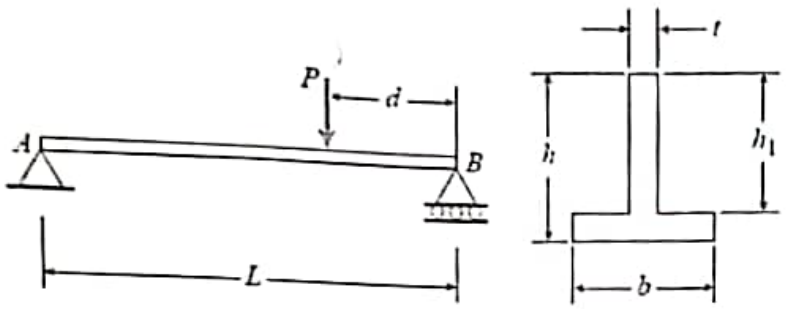
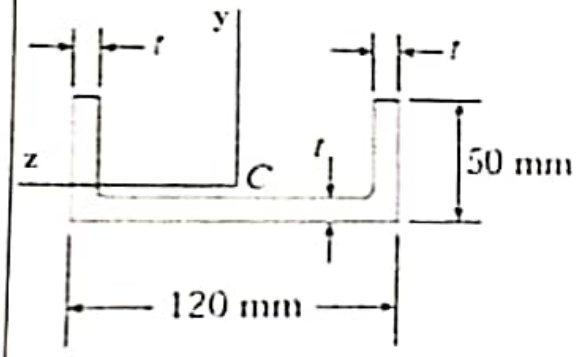
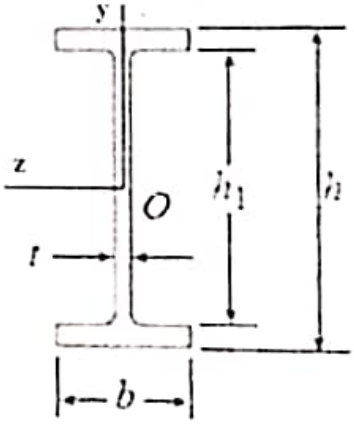
3.	Determine the maximum tensile stress σ_t and maximum compressive stress σ_c due to the load P acting on the simple beam AB (see Fig. 3). Data are as follows: P = 5.4 kN, L = 3.0 m, d = 1.2 m, b = 75 mm, t = 25 mm, h = 100 mm, and $h1$ = 75 mm. Also draw the bending stress distribution.  Fig. 3	10	CO3	BL3
4.	A beam having a cross section in the form of a channel (see Fig. 4) is subjected to a bending moment acting about the z axis. Calculate the thickness t of the channel in order that the bending stresses at the top and bottom of the beam will be in the ratio 7:3, respectively.  Fig. 4  Fig. 5	10	CO3	BL4
5.	A wide-flange beam (see Fig. 5) having the cross section described below is subjected to a shear force V. Using the dimensions of the cross section, calculate the moment of inertia and then determine the following quantities: (a) The maximum (τ_{max}) and minimum shear stress (τ_{min}) in the web. (b) The average shear stress τ_{aver} and the ratio τ_{max}/τ_{aver}. (c) The shear force V_{web} carried in the web and the ratio V_{web}/V. Also draw the shearing stress distribution. Dimensions of cross section: b = 180 mm, t = 12 mm, h =420 mm, h_1 = 380 mm, and V = 125 kN.	10	CO3	BL3