

**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)**SCHOOL OF MECHANICAL ENGINEERING**
CONTINUOUS ASSESSMENT TEST (CAT) -II
FALL SEMESTER 2024-2025

SLOT: A2

REG.NO.:

Programme Name & Branch

Course Code

Course Name

Faculty Name(s)

Class Number(s)

Date of Examination

Exam Duration

: B. Tech Mechanical Engineering
: BMEE202L

: Mechanics of Solids

: Dr. Akash Mohanty, Dr. Edwin Sudhagar P, Dr. Murug
M. and Rajesh M.

: VL2024250103825, 3826, 3824 and 3828

: 13th October 2024.

: 90 minutes

Maximum Marks: 50

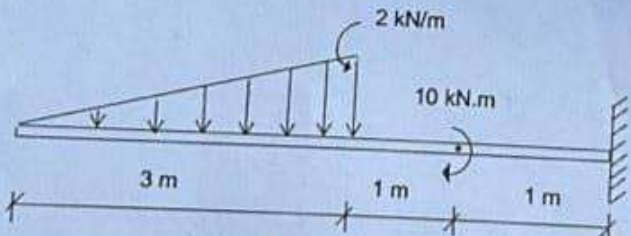
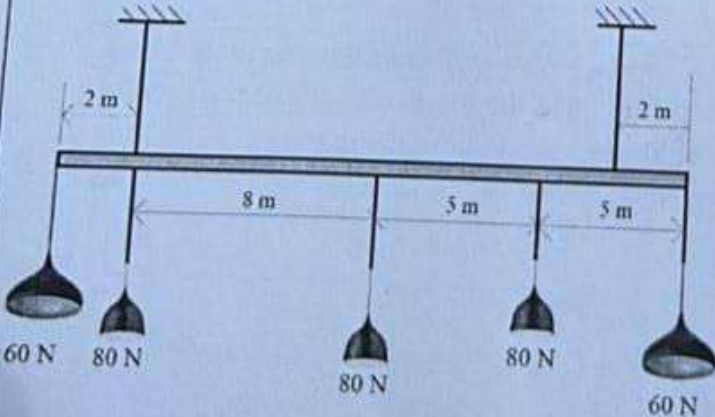
Answer all questions**General instruction(s):**

- M - Max mark; CO - Course Outcome; BL - Bloom's Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyze, 5 - Evaluate, 6 - Create)
- Course Outcomes

CO 2: Illustrate the relationship among load, shear force and bending moment for various be

CO 3: Evaluate the bending and shear stresses for beams with varying cross sections

CO 4: Calculate the slope and deflection of various beams

Q. No	Question	M	CO	
1.	A cantilever beam of span 5 m is loaded with a uniformly varying load and a moment as shown in figure 1. Draw its shear force and bending moment diagram. Find the maximum shear force, bending moment and point of contraflexure.  Figure 1	10	CO 2	B
2.	A horizontal rod of 20 m length is carrying lights as shown in figure 2. Draw the shear force and bending moment diagram for the 20 m rod.  Figure 2	10	CO2	B



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3. A hollow circular shaft of 100 mm outside diameter and 70 mm inside diameter is carrying a uniformly distributed load 5 kN/m as shown in figure 3. Draw its bending moment diagram and find the point of maximum bending stress. Plot the bending stress distribution across cross section at the point of maximum bending moment.

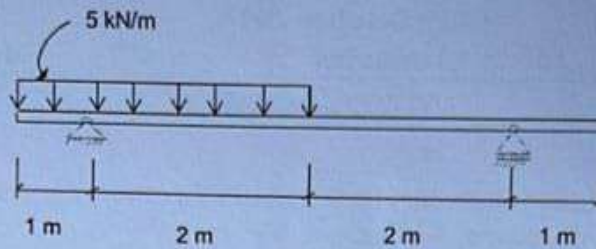


Figure 3

10

CO3

4. A simply supported beam of span 3 m and "I" cross section as shown in figure 4, is loaded with a uniformly distributed load of 25 kN/m. Calculate the maximum bending stress and plot the stress distribution across cross section.

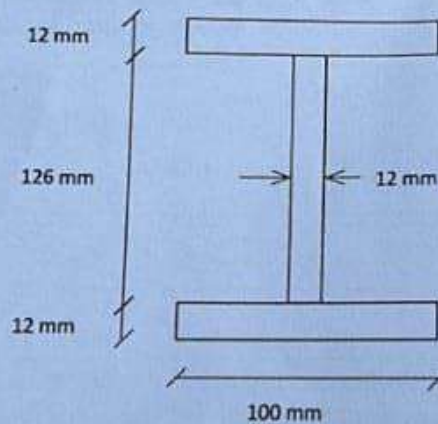


Figure 4

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CO3

5. A cantilever beam of span 2 m is loaded with a uniformly varying load, which varies from 0 kN/m at free end to 3 kN/m at the fixed end. If the cross section is square of side 25 mm and if the Young's modulus of the material is 200 GPa. Derive the slope and deflection equation for the beam and find the free end slope and deflection.

10

CO