VIT®

Vellore Institute of Technology

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

SLOT: C1+TC1

SCHOOL OF MECHANICAL ENGINEERING

CONTINUOUS ASSESSMENT TEST – II

FALL SEMESTER 2023-2024

Programme Name & Branch: B.Tech. (Mechanical/Automotive/Manufacturing)
Course Code: BMEE202L
Course Name: MECHANICS OF SOLIDS
Faculty Name(s): Sharan Chandran M, Venkatesan S, Vasudevan R, Akash Mohanty, Yagna S Mukkamala, Sovan Sundar Dasgupta
Class Number(s): VL2023240101687/1694/1691/1690/1693/1689
Exam Duration: 90 minutes **Maximum Marks: 50**

General instruction(s): Open text book/open note book mode of exam. Answer all the questions. Assume the missing data (if any). Answer to the point and tabulate your final results.

Each question carries equal marks. (10 × 5 = 50)

Q 1. A symmetric I-section beam (with width of each flange = 50 mm, thickness of each flange = 10 mm, and thickness of web = 10 mm) of steel is subjected to a shear force of 100 kN (figure 1). Find the magnitude of the shear stress (in N/mm^2) in the web and at its junction with the top flange.

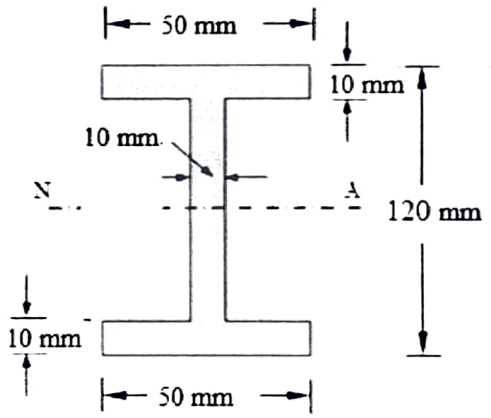

Fig. No.: 1

Q 2. Calculate the maximum stress induced in a cast iron pipe of external diameter 40 mm internal diameter 20 mm and length 4 m when the pipe is supported at is ends, carries a point load of 80 N at is centre.

Q 3. A constant load of w_0 per unit length is applied on a simply supported beam as shown in figure 2. Draw the shear force, bending moment diagrams and find the point of contra-flexure (if any). Also establish the relation between S.F., and B.M at the mid-section of this beam.

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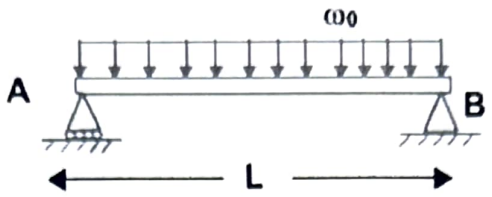

Fig. No.: 2

Q 4. A beam of I-section (figure 3) is simply supported over a span of 10 m. It carries a uniform load of 4 kN/m over the entire span. Evaluate the maximum bending stresses.

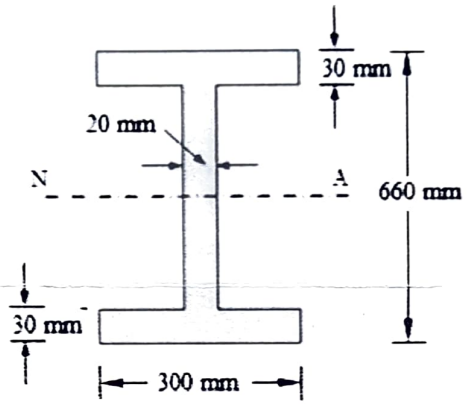

Fig. No. 3

Q 5. The overhanging beam ABC is supported at A and B, the span AB being 6 m. The overhang BC is 2 m (Fig. 4)). It carries a uniformly distributed load of 30 kN/m over a length of 3 m from A and concentrated load of 20 kN at free end. Draw SF and BM diagrams. Locate the point of contra flexure from point C. (8th module guest lecture).

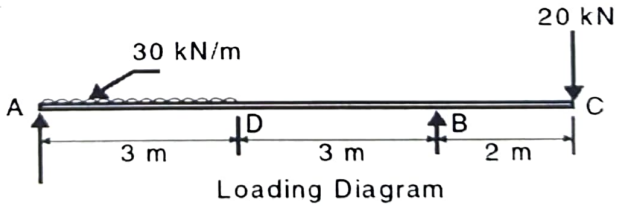

Fig. No.: 4