

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- MARCH-2023

MTECH (SE) II SEMESTER

COURSE CODE(CREDITS): 12M1WCE211 (3)

MAX. MARKS: 15

COURSE NAME: SOLID MECHANICS IN STRUCTURAL ENGINEERING

COURSE INSTRUCTORS: Dr. Tanmay Gupta

MAX. TIME: 1 Hour

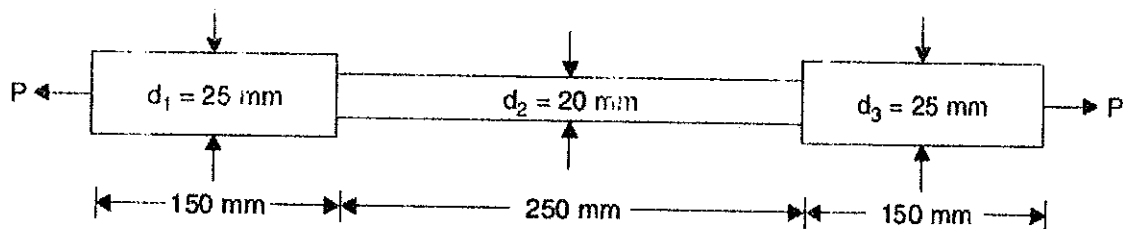
Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q.1 Distinguish between

(i) Elastic limit and yield point. (ii) Nominal stress and true stress. [1+1]

Q.2 A bar of uniform thickness t tapers uniformly from a width b_1 at one end to b_2 at the other end in a length L . Find the expression for its extension under an axial pull P . [2]

Q.3 The bar shown in Figure below is tested in universal testing machine. It is observed that at a load of 40 kN the total extension of the bar is 0.280 mm. Determine the Young's modulus of the material. [3]



Q.4 A bar 30 mm in diameter was subjected to tensile load of 54 kN and measured extension of 300 mm gauge length was 0.112 mm and change in diameter was 0.00366 mm. Calculate Poisson's Ratio and the value of three moduli. [4]

Q.5 A Concrete column of C.S. area 400 x 400 mm reinforced by 4 longitudinal 50 mm diameter round steel bars placed at each corner of the column. Calculate (1) maximum axial compressive load the column can support & (ii) loads carried by each material & compressive stresses produced in each material. Take Also calculate change in length of the column. Assume the column in 2m long. Permissible stresses in steel and concrete are 160 and 5MPa respectively. Take $E_s = 200\text{GPa}$ and $E_c = 14\text{GPa}$. [4]