Name : ..... Roll No : .....

MAR ATHANASIUS COLLEGE OF ENGINEERING

(Government Aided Autonomous Institution)
Kothamangalam, Kerala – 686 666

DEPARTMENT OF MECHANICAL ENGINEERING

B24ME2T01 – MECHANICS OF SOLIDS

Second Sessional Examination – October 2026

Duration: 1 hour 30 minutes **S3 ME A & B Batch** **Max. Marks: 40**

Part A

(1) When a circular shaft is subjected to torsion, what type of stress is induced in an element of the shaft? Draw the distribution of this stress across the cross-section of the shaft.(CO3) (3)

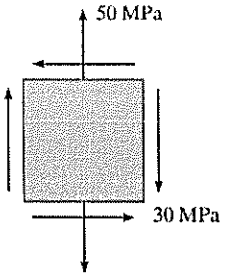
(2) Which one do you recommend for power transmission, hollow or solid shaft? Justify. (CO3) (3)

(3) What is column buckling? Give one practical example. (CO3) (3)

(4) What assumptions are made in the derivation of the flexural formula?(CO4) (3)

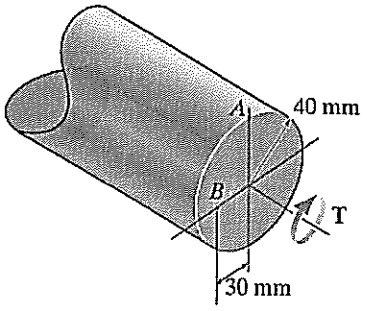
Part B

(5) a. For the element shown in figure, using Mohr's circle determine (i) the principal stresses and (ii) the maximum in-plane shear stress and average normal stress. Specify the orientation of the element in each case.(CO2) (7)

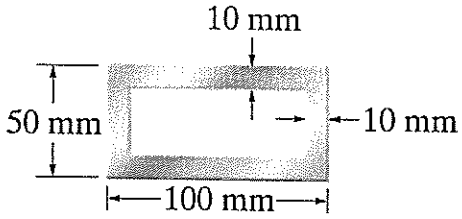


b. A hollow alloy tube 5 m long with external and internal diameters of 40 mm and 25 mm, respectively, was found to extend 6.4 mm under a tensile load of 60 kN. Find the buckling load for the tube when used as a column with both ends hinged. Also, find the safe load for the tube, taking a factor of safety = 4. (CO3) (7)

(6) a. The solid circular shaft is subjected to an internal torque of T = 5 kNm. Determine the shear stress developed at points A and B. Represent each state of stress on a volume element. (CO3) (7)



b. An A-36 steel column has a length of 5 m and is fixed at both ends. If the cross-sectional area has the dimensions shown, determine the critical load. Take E = 200 GPa.(CO3) (7)



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