

DEPARTMENT OF APPLIED MECHANICS

AML150 : Mechanics of Solids and Fluids
Major Test (1st Sem. 2008-09)

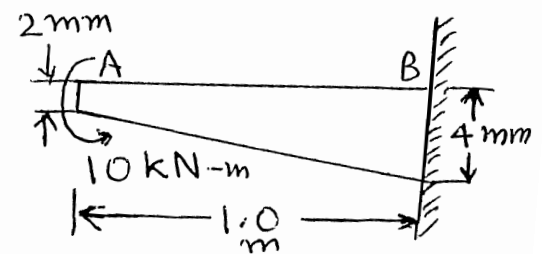
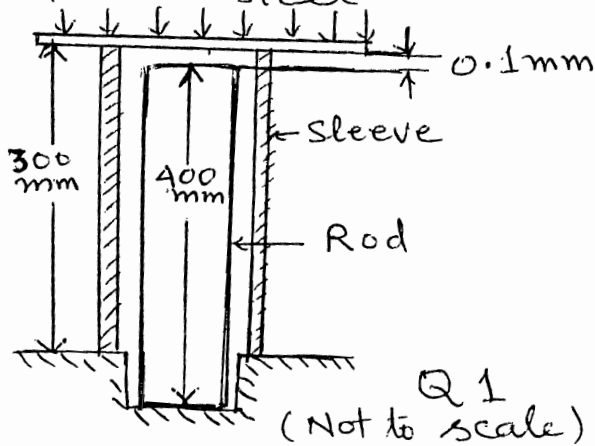
Note : Answer all Questions

Time : 1:00 - 3:00 p.m.

Q 1 A steel rod of dia. 32 mm is supported in a recess (See figure below) and is surrounded by a brass sleeve (int. dia. = 45 mm, ext. dia. = 50 mm). Initially the top of sleeve is 0.1 mm above that of the rod, as shown. The assembly is tested in a compression testing machine. Determine the magnitude of the load if the stresses in the rod and the sleeve are not to exceed 110 MPa and 80 MPa, respectively. Also find the shortening of the sleeve when the load is such that both the rod and the sleeve experience same stress.

Max. Marks : 70

Take $E_{\text{steel}} = 210 \text{ GPa}$, $E_{\text{brass}} = 105 \text{ GPa}$ (12)



Q 2(a). Derive the beam deflection equation for a beam with variable flexural rigidity, (EI) , starting from Bernoulli-Euler equation. (5)

Q 2(b) A tapered beam with an end moment is shown in the figure. The depth of the beam varies linearly from 2 mm at the loaded end ^(A) to 4 mm at the fixed end (B). The width of the beam is 1.5 cm throughout.