NSAST

NATIONAL SCHOOL OF AUTONOMOUS SYSTEMS TECHNOLOGY
المدرسة الوطنية العليا لتكنولوجيا للأنظمة المستقلة

Academic year 2024/2025

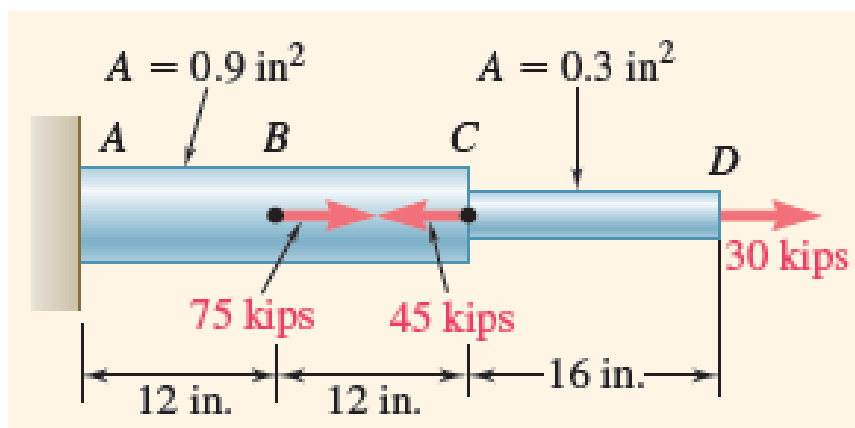**2nd Year**   **Mechanics of Materials (Material Strength)**

T.D N° 5   (Internal cohesive forces and moments – Method of sections [cuts] – Notion of Stress)
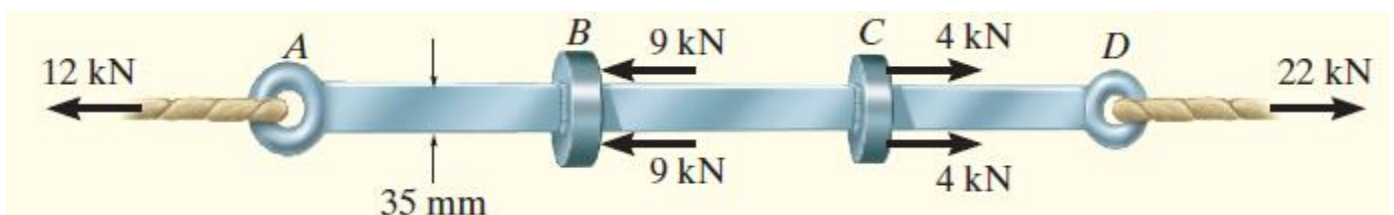
Problem 1 :

Find the internal forces P_1, P_2 and P_3 of the steel rod shown under the given loads. The rod is divided into three component parts.
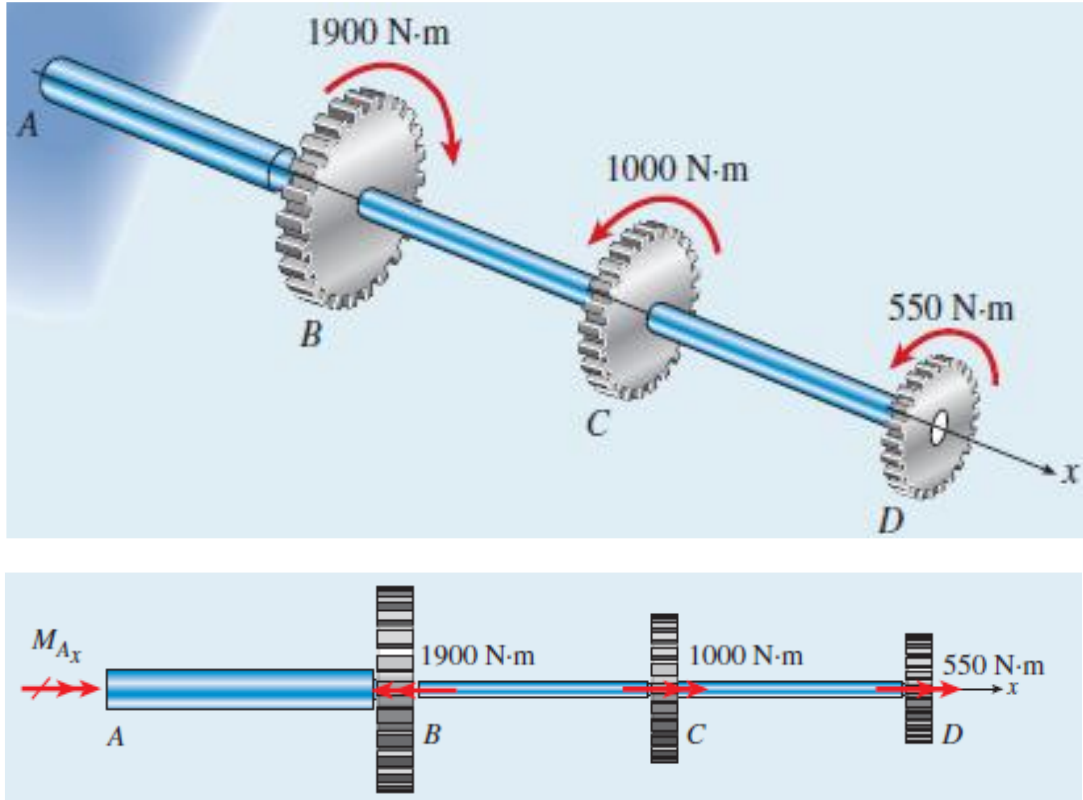

Problem 2 :

The bar in Figure below has a constant width of 35 mm and a thickness of 10 mm is subjected to the loading shown.
Draw the corresponding diagram of normal force and thus determine the location and the value of the maximum average normal stress in the bar.

Problem 3 :

A stepped circular shaft is fixed at *A* and has three gears that transmit the torques shown in Figure. Find the reaction torque at *A*, then find the internal torsional moments in segments *AB*, *BC*, and *CD*. Use properly drawn free-body diagrams in your solution. (use the static sign convention ; right-hand rule is positive).

Problem 4 :

Using the direct method (Cauchy's relation), determine the normal and shear stresses on the face inclined with $\theta = 30°$. Draw these stresses on this face.