NSAST
NATIONAL SCHOOL OF AUTONOMOUS SYSTEMS TECHNOLOGY
المدرسة الوطنية العليا لتكنولوجيا الأنظمة المستقلة

Academic year 2024/2025
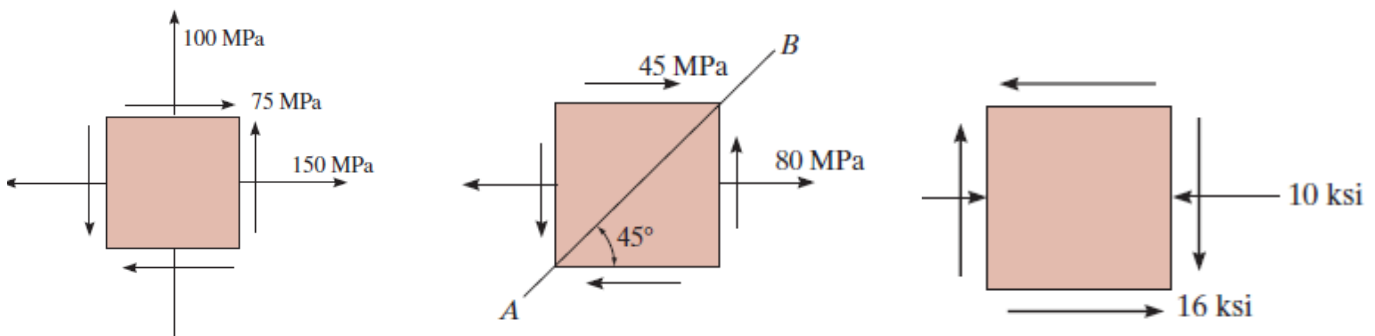
2ⁿᵈ Year   **Mechanics of Materials (Material Strength)**

T.D N° 6   (Notion of Stress- Plane Stress Transformation, Principal Stresses and Maximum In-Plane shear Stress)
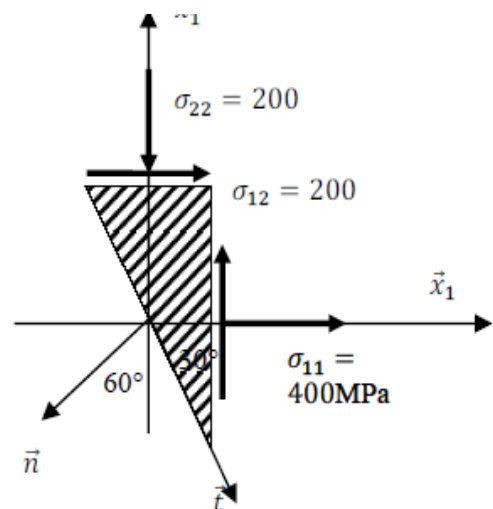
Problem 1 :

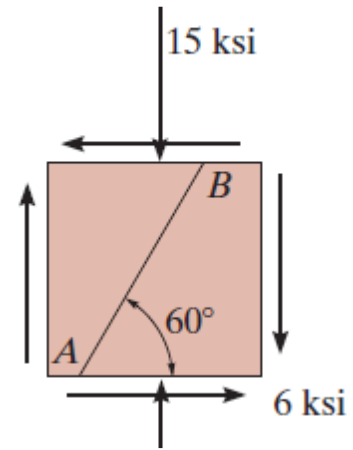Give the values of the different stresses shown in the following figures

Problem 2 :

Using the direct method (Cauchy's relation), determine the normal and shear stresses on the face inclined with θ = 30°. Draw these stresses on this face.
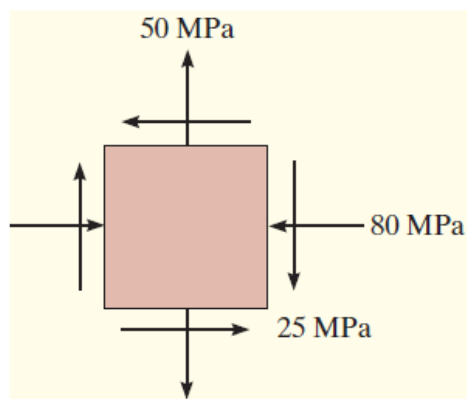
Problem 3:

Determine the normal stress and shear stress acting on the inclined plane *AB*. Solve the problem using the stress transformation equations. Show the results on the sectional element.

Problem 4:

The state of plane stress at a point is represented on the element shown in Fig.
Determine the state of stress at this point on another element oriented 30° clockwise from the position shown (plane CD). Represent these stresses on the fig.
Calculate the same stresses on the plane BC perpendicular to this plane and compare the results. Represent these stresses on the fig. Are these directions Principal

Problem 5:

The plane stress state at a point is shown in the following element. Calculate and represent the principal stresses in the figure.
Calculate and represent the maximum shear stress in this case.