# ESO 202A/204: Mechanics of Solids (2016-17 II Semester)
# Assignment No. – 3

3.1 Using Mohr's circle find out the principal stresses and their directions. Find also the maximum shearing stress and its plane (Fig. 3.1).

3.2 Plot Mohr's circle for the state of stress shown in Fig 3.2. Find principal stresses and the maximum shear stress. Show them on properly oriented elements.

3.3 Find the principal stress directions if the state of stress at a point is the sum of the two states of stress illustrated in Fig 3.3. Use Mohr's construction.

3.4 At some point in an elastic body, the stresses on a plane AB are zero (Fig. 3.4). It is known that the maximum shearing stress at that point is 500 MPa. Determine the stress component at this point on a plane where normal is in y-direction. Use Mohr's construction.

3.5 The stresses on two planes passing through a point are shown in Fig. 3.5. Determine stresses on the plane AB. Also find the maximum shear stress. Use Mohr's construction.

3.6 A rectangular plate is made up of two trapezoidal plates glued together as shown in Fig. 3.6. Using Mohr's construction, determine the inclination ($\alpha$) of the joint if it is known that the joint cannot resist any shear or tensile stress. It can be assumed that the state of stress at any point in the plate is:

$\sigma_{xx} = 100$ MPa $\quad \sigma_{yy} = -50$ MPa $\quad \tau_{xy} = -40$ MPa

3.7 The state of stress at two planes passing through a point O is shown in Fig. 3.7. Using Mohr's construction, obtain the magnitude of principal stresses.

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**Fig. 3.1**

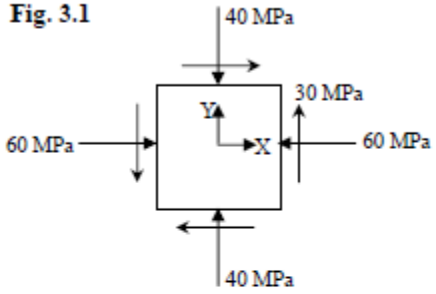


**Fig. 3.2**

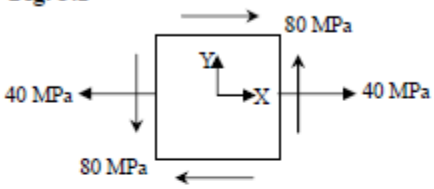


**Fig. 3.3**

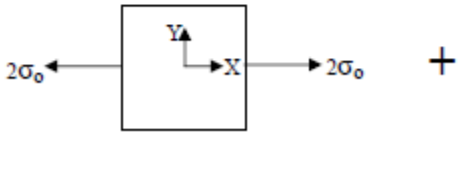


**Fig. 3.4**

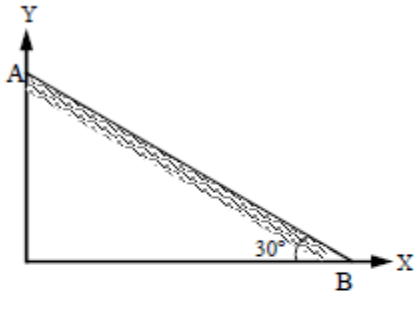


**Fig. 3.5**

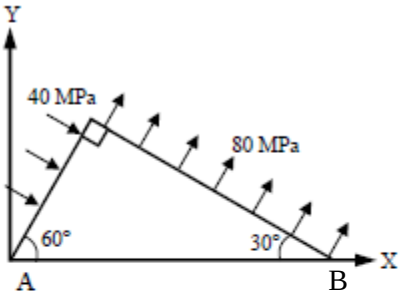


**Fig. 3.6**

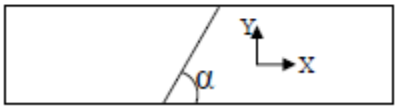


**Fig. 3.7**