3D-Mohr Circle

Q1. State of stress at a point P is given as

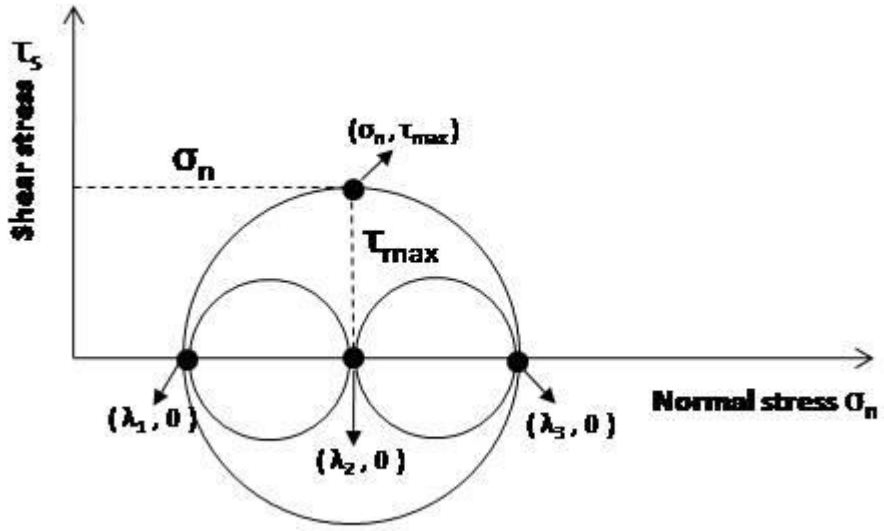
$$\sigma = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

Draw 3D- Mohr circle

Step-1: Find the principal stress at point P

$$\lambda_1 = 1,\ \lambda_2 = 2,\ \lambda_3 = 3$$

Step-2 : Draw a co-ordinates in which vertical axis represents shear stress and horizontal axis represents normal stress.



3D-mohr circle

- Maximum shear stress is equal to radius of largest circle in 3D- mohr circle

$$\tau_{max} = \frac{\lambda_3 - \lambda_1}{2}$$

- Normal stress act on a plane of maximum shear stress is equal to

$$\sigma_n = \frac{\lambda_3 + \lambda_1}{2}$$

- Normal stress and shear stress on any arbitrary plane is a region lies inside largest mohr circle excluding area inside other two circle in 3D- Mohr circle.