

## Upload Tugas

**NAMA** : DEVIA ROZA  
**NIM** : 192710047  
**PRODI** : TEKNIK SIPIL – S2  
**KONSENTRASI** : STRUKTUR DAN BAHAN  
**MK** : MEKANIKA TERAPAN  
**DOSEN** : Dr. FIRDAUS, M.T.  
**TUGAS** : 12



Untuk tegangan-tegangan yang bekerja sebagai berikut, tentukan tegangan principal, tegangan geser maksimum dan arah tegangan principal.

$$\sigma_x = 210 \text{ MPa}$$

$$\sigma_y = 60 \text{ MPa}$$

$$\tau_{xy} = 45 \text{ MPa}$$

**PENYELESAIAN:**

$$\sigma = \frac{\sigma_x + \sigma_y}{2} = \frac{210 + 60}{2} = 135 \text{ MPa}$$

$$\text{Jari - jari} = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + (\tau_{xy})^2} = \sqrt{75^2 + 45^2} = 87,46$$

$$\sigma_{\text{maks}} = \frac{\sigma_x + \sigma_y}{2} \pm \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + (\tau_{xy})^2}$$

$$\sigma_{\text{maks}} = \sigma \pm \text{jari - jari}$$

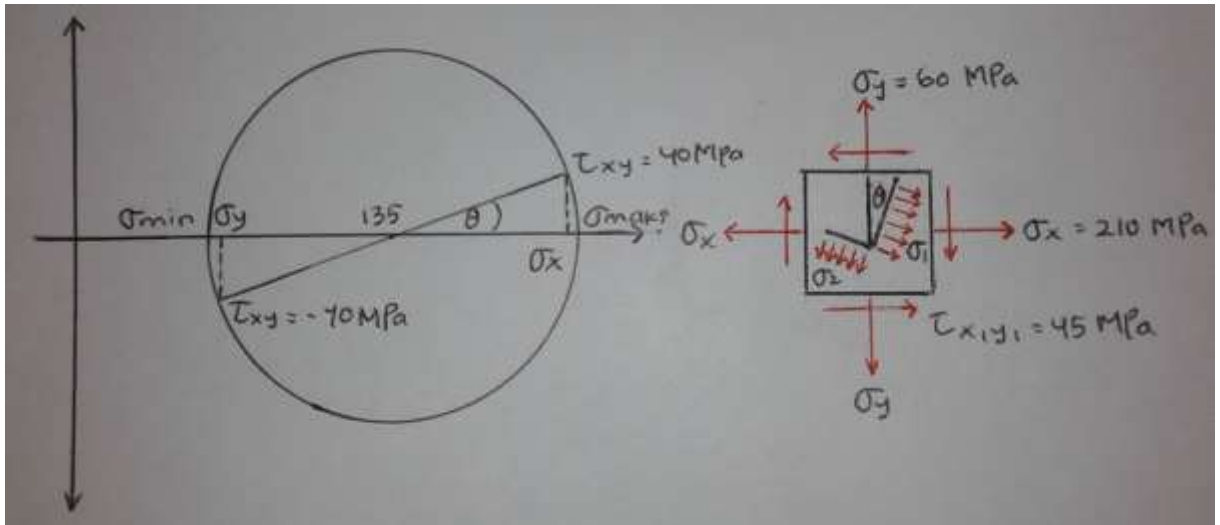
$$\sigma_{\text{maks}} = 135 + 87,46 = 222,46 \text{ MPa} \rightarrow \sigma_1 = \text{tegangan principal maksimum saat } \tau_{xy} = 0$$

$$\sigma_{\text{min}} = 135 - 87,46 = 47,54 \text{ MPa} \rightarrow \sigma_2 = \text{tegangan principal minimum saat } \tau_{xy} = 0$$

$$\tan\theta = \frac{\tau_{xy}}{\sigma} = \frac{45}{135} \rightarrow \theta = 18,26^\circ$$

$$\text{Pada bidang} = \frac{18,26^\circ}{2} = 9,13^\circ$$

$$\tau_{\text{maks}} = \frac{\sigma_x - \sigma_y}{2} = \frac{210 - 60}{2} = 75 \text{ MPa}$$



## TUGAS-12

### MEKANIKA TERAPAN (MTS 271201)



Oleh :

Nama : Saeman

NIM : 192710038

Dosen Program : Dr. Firdaus, ST., M.T

**PROGRAM PASCASARJANA MAGISTER TEKNIK SIPIL**

**UNIVERSITAS BINA DARMA**

**2020**

## Tugas - 12

Untuk tegangan-tegangan yang bekerja sebagai berikut, tentukan tegangan principal, tegangan geser maksimum dan arah tegangan principal.

$$\sigma_x = 210 \text{ MPa}$$

$$\sigma_y = 60 \text{ MPa}$$

$$\tau_{xy} = 45 \text{ MPa}$$

**Jawab :**

$$\sigma = \frac{\sigma_x + \sigma_y}{2} = \frac{210 + 60}{2} = 135 \text{ MPa}$$

$$\text{jari - jari} = \sqrt{(210 - 135)^2 + 45^2} = 87,46$$

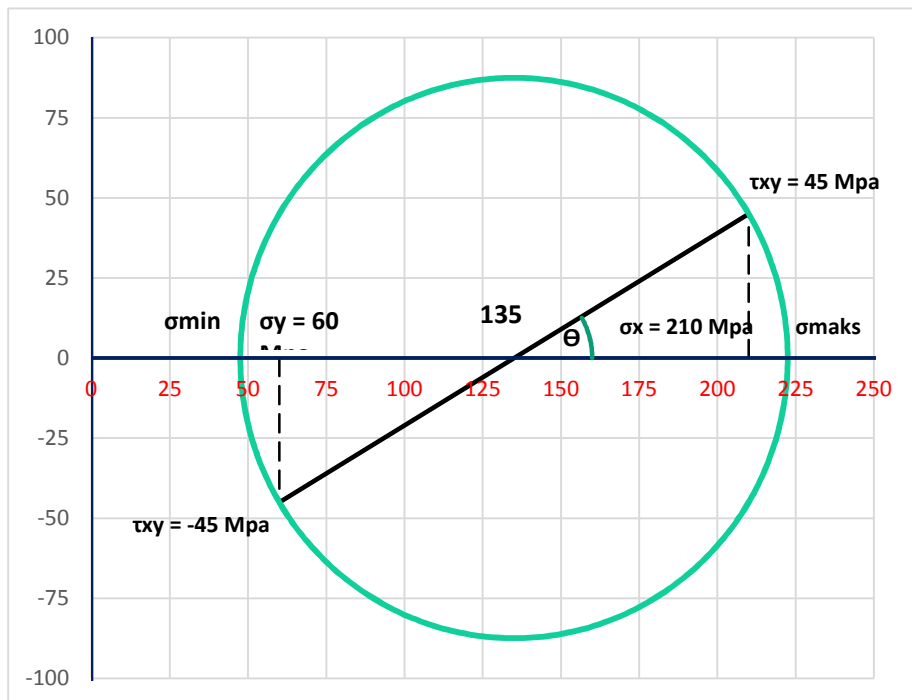
$$\sigma_{maks} = 135 + 87,46 = 222,46 \text{ MPa} \rightarrow \sigma_1 = \text{maximum principal stress, saat } \tau_{xy} = 0$$

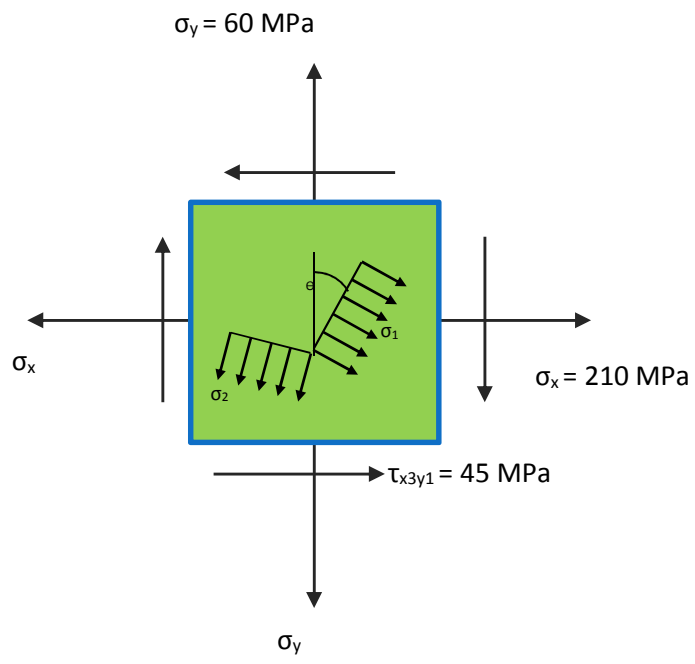
$$\sigma_{min} = 135 - 87,46 = 47,54 \text{ MPa} \rightarrow \sigma_2 = \text{minimum principal stress, saat } \tau_{xy} = 0$$

$$\tan \theta = \frac{45}{135} = 18,43^\circ$$

$$\text{pada bidang} = \frac{18,43^\circ}{3} = 6,14^\circ$$

$$\tau_{maks} = 45 \text{ MPa}$$





Nama Mahasiswa : Agus Rudianto/ 192710046/ MTS4  
 Mata Kuliah : **MEKANIKA TERAPAN (MTS271201)**  
 Dosen : Dr. Firdaus, M.T.  
 Tugas : EL. 12

Tugas ke-12:

Untuk tegangan-tegangan yang bekerja sebagai berikut, tentukan tegangan principal, tegangan geser maksimum dan arah tegangan principal.

$\sigma_x = 210 \text{ MPa}$   
 $\sigma_y = 60 \text{ MPa}$   
 $\tau_{xy} = 45 \text{ MPa}$

Jawab: 
$$\bar{\sigma} = \frac{\sigma_x + \sigma_y}{2} = \frac{210 \text{ MPa} + 60 \text{ MPa}}{2} = 135 \text{ MPa}$$

Jari-jari = 
$$\sqrt{(210 - 135)^2 + 45^2}$$
  

$$= 87,46 \text{ MPa}$$

$$\sigma_{\max} = 135 + 87,46 = 222,46 \text{ MPa} \rightarrow \sigma_1 = \text{Max. principal stress}$$
  
 Saat  $\tau_{xy} = 0$

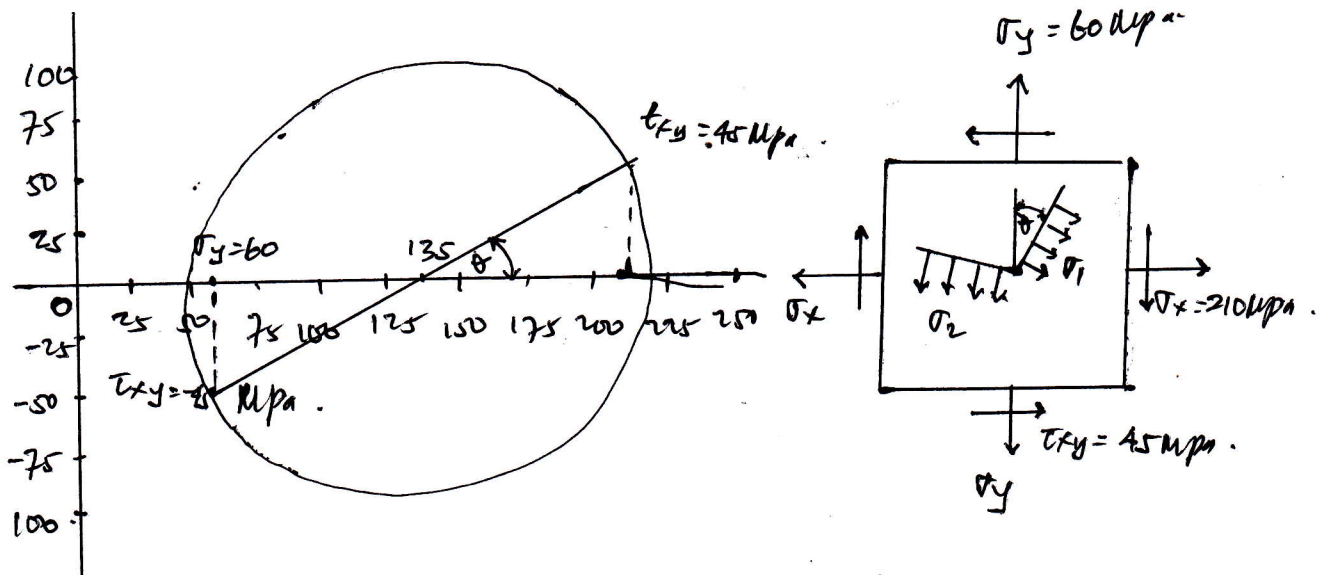
$$\sigma_{\min} = 135 - 87,46 = 47,54 \text{ MPa} \rightarrow \sigma_2 = \text{Min principal stress}$$
  
 Saat  $\tau_{xy} = 0$

$$\tan \theta = \frac{45}{135} = 18,43^\circ$$

Pada Bidang = 
$$\frac{18,43^\circ}{3}$$
  

$$= 6,14^\circ$$
  

$$\tau_{\max} = 135 \text{ MPa}$$



NAMA : ANDI SUPRIYADI  
 NIM : 192710035  
 ANGKATAN : MTS-4

**TUGAS : 12**

Untuk tegangan-tegangan yang bekerja sebagai berikut, tentukan tegangan principal, tegangan geser maksimum dan arah tegangan principal.

$$\sigma_x = 210 \text{ MPa}$$

$$\sigma_y = 60 \text{ MPa}$$

$$\tau_{xy} = 45 \text{ MPa}$$

**Jawab :**

$$\sigma = \frac{\sigma_x + \sigma_y}{2} = \frac{210 + 60}{2} = 135 \text{ MPa}$$

$$\text{jari - jari} = \sqrt{(210 - 135)^2 + 45^2} = 87,46$$

$$\sigma_{maks} = 135 + 87,46 = 222,46 \text{ MPa} \rightarrow \sigma_1 = \text{maximum principal stress, saat } \tau_{xy} = 0$$

$$\sigma_{min} = 135 - 87,46 = 47,54 \text{ MPa} \rightarrow \sigma_2 = \text{minimum principal stress, saat } \tau_{xy} = 0$$

$$\tan \theta = \frac{45}{135} = 18,43^\circ$$

$$\text{pada bidang} = \frac{18,43^\circ}{3} = 6,14^\circ$$

$$\tau_{maks} = 135 \text{ MPa}$$

