

Teknik Mesin UMY

Ujian Kompetensi #1

Statika Struktur (MEU 2303 P)

Rabu, 1 Maret 2017

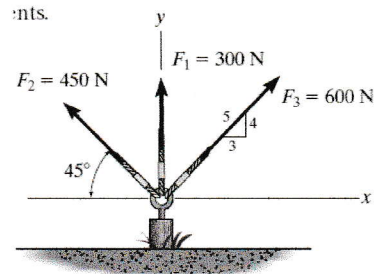
Dosen penguji: Berli Kamiel, S.T., M.Eng.Sc., Ph.D.

Sifat ujian: buku tertutup

Waktu mengerjakan soal: 90 menit

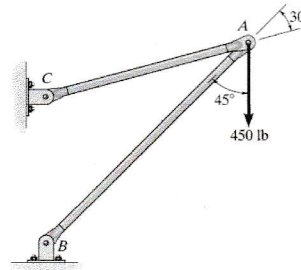
Peralatan yang diperbolehkan: kalkulator (bukan kalkulator dari *handphone*)

1. Tentukan besar dan arah resultan pada Gambar 1 disamping. Gunakan metode komponen *rectangular* notasi vektor. (bobot soal: 30%)



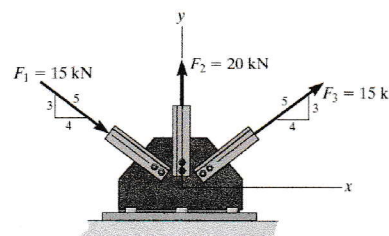
Gambar 1

2. Pada Gambar 2., Uraikan gaya 450 lb menjadi komponen-komponen gaya yang bekerja sepanjang batang AB dan AC. Tentukan pula besar masing-masing komponen gaya tersebut. (bobot soal: 30%)



Gambar 2

3. Tentukan besar dan arah gaya resultan pada system gaya koplanar pada Gambar 3. Gunakan metode komponen *rectangular* notasi scalar. (bobot soal: 40%)



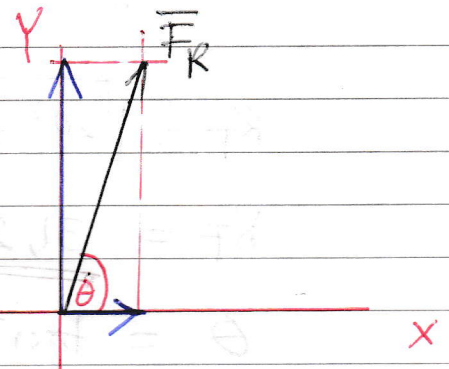
Gambar 3

NAMA : Statika Struktur
 NO. KURSI : UCP #1
 NO. MAHASISWA : Rabu, 1 Maret 2017
 FAKULTAS : TEKNIK JURUSAN
 MATA UJIAN : _____
 DOSEN : _____
 HARI/TGL : _____
 TANDA TANGAN : _____

#1.

$$\begin{aligned}
 \vec{F}_1 &= 300j \\
 \vec{F}_2 &= -480\cos 45^\circ i + 480\sin 45^\circ j \\
 \vec{F}_3 &= 600\left(\frac{3}{5}\right)i + 600\left(\frac{4}{5}\right)j
 \end{aligned}$$

$$\begin{aligned}
 \vec{F}_1 &= 300j \\
 \vec{F}_2 &= -318,2i + 318j \\
 \vec{F}_3 &= 360i + 480j + \\
 \vec{F}_R &= 41,8i + 1098j
 \end{aligned}$$



$$\vec{F}_R = 41,8i + 1098j$$

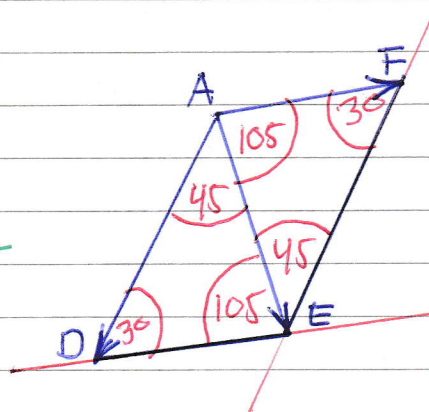
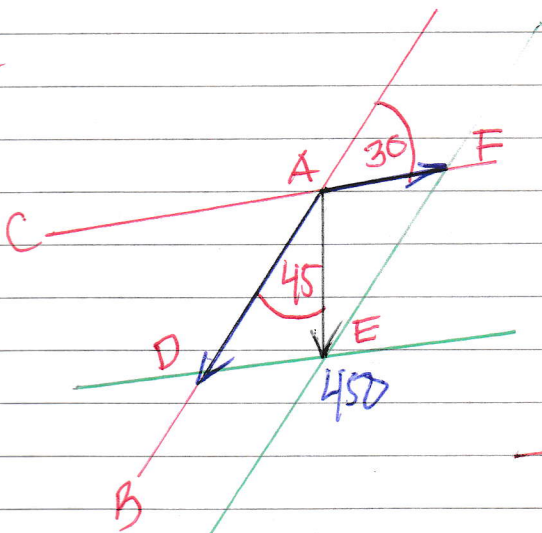
$$F_R = \sqrt{41,8^2 + 1098^2}$$

$$F_R = 1098,8 \text{ N}$$

$$\theta = \tan^{-1} \frac{1098}{41,8}$$

$$\theta = 87,8^\circ$$

#2



$$\frac{F_{AF}}{\sin 45^\circ} = \frac{450}{\sin 30^\circ}$$

$$F_{AF} = \frac{\sin 45^\circ \times 450}{\sin 30^\circ}$$

$$F_{AF} = 636,4 \text{ lb.}$$

$$\frac{F_{AD}}{\sin 105^\circ} = \frac{450}{\sin 30^\circ}$$

$$F_{AD} = \frac{\sin 105^\circ \times 450}{\sin 30^\circ} = 869,3 \text{ lb.}$$

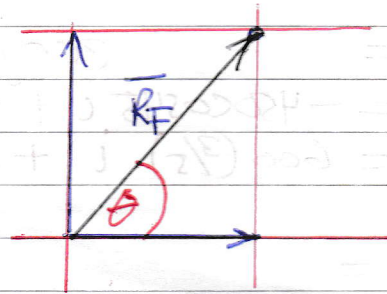
#3.

$$\rightarrow R_{Fx} = F_{1x} + F_{3x} + F_{2x} = 15\left(\frac{4}{5}\right) + 15\left(\frac{4}{5}\right) + 0$$

$$\uparrow R_{Fy} = -F_{1y} + F_{2y} + F_{3y} = -15\left(\frac{3}{5}\right) + 20 + 15\left(\frac{3}{5}\right)$$

$$\rightarrow R_{Fx} = 24$$

$$\uparrow R_{Fy} = 20$$



$$R_F = \sqrt{24^2 + 20^2}$$

$$R_F = \underline{\underline{31,2 \text{ kN}}}$$

$$\theta = \tan^{-1}\left(\frac{20}{24}\right)$$

$$\theta = \underline{\underline{39,8^\circ}}$$