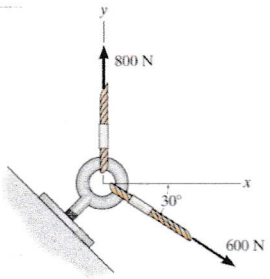
Teknik Mesin UMY

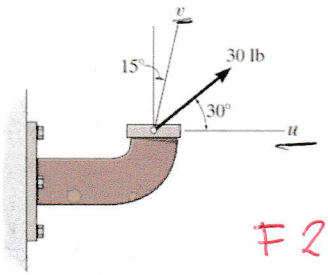
Ujian Kompetensi #1
Statika Struktur (MEU 2303 P)
Selasa, 28 Februari 2017
Dosen penguji: Berli Kamiel, S.T., M.Eng.Sc., Ph.D.
Sifat ujian: buku tertutup
Waktu mengerjakan soal: 90 menit
Peralatan yang diperbolehkan: kalkulator (bukan kalkulator dari *handphone*)

1. Tentukan besar dan arah resultan pada Gambar 1 disamping. Gunakan metode jajaran genjang. (bobot soal: 30%)



Gambar 1

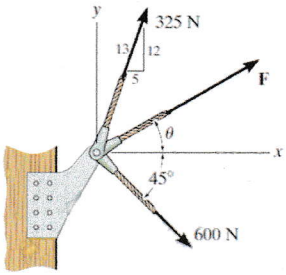
2. Pada Gambar 2., Uraikan gaya 30 lb menjadi komponen-komponen gaya pada sumbu *u* dan *v*. Tentukan pula besar masing-masing kompnen gaya tersebut. (bobot soal: 30%)



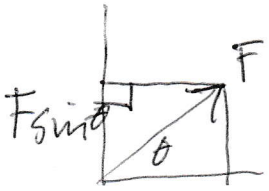
F 2.10

Gambar 2

3. Jika besar gaya resultan yang bekerja pada *bracket* pada Gambar 3 adalah 750 N dan bekerja sepanjang sumbu *x* positif, tentukan besar gaya F dan arahnya. (bobot soal: 40%)



Gambar 3



UNIVERSITAS MUHAMMADIYAH YOGYAKARTA

NAMA : Statika Struktur

NO. KURSI : UCP #1

NO. MAHASISWA : Selasa 28/02/2017

FAKULTAS : TEKNIK, JURUSAN :

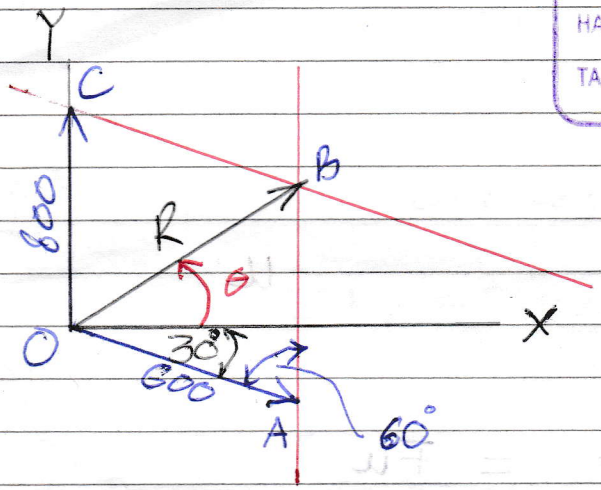
MATA UJIAN :

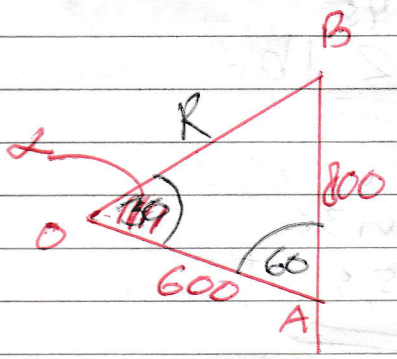
DOSEN :

HARI/TGL :

TANDA TANGAN :

#1





$$R = \sqrt{600^2 + 800^2 - 2 \times 600 \times 800 \cos 60}$$

$$R = \sqrt{520.000} = 721{,}11\ N$$

$$\frac{\sin 60}{R} = \frac{\sin \alpha}{800}$$

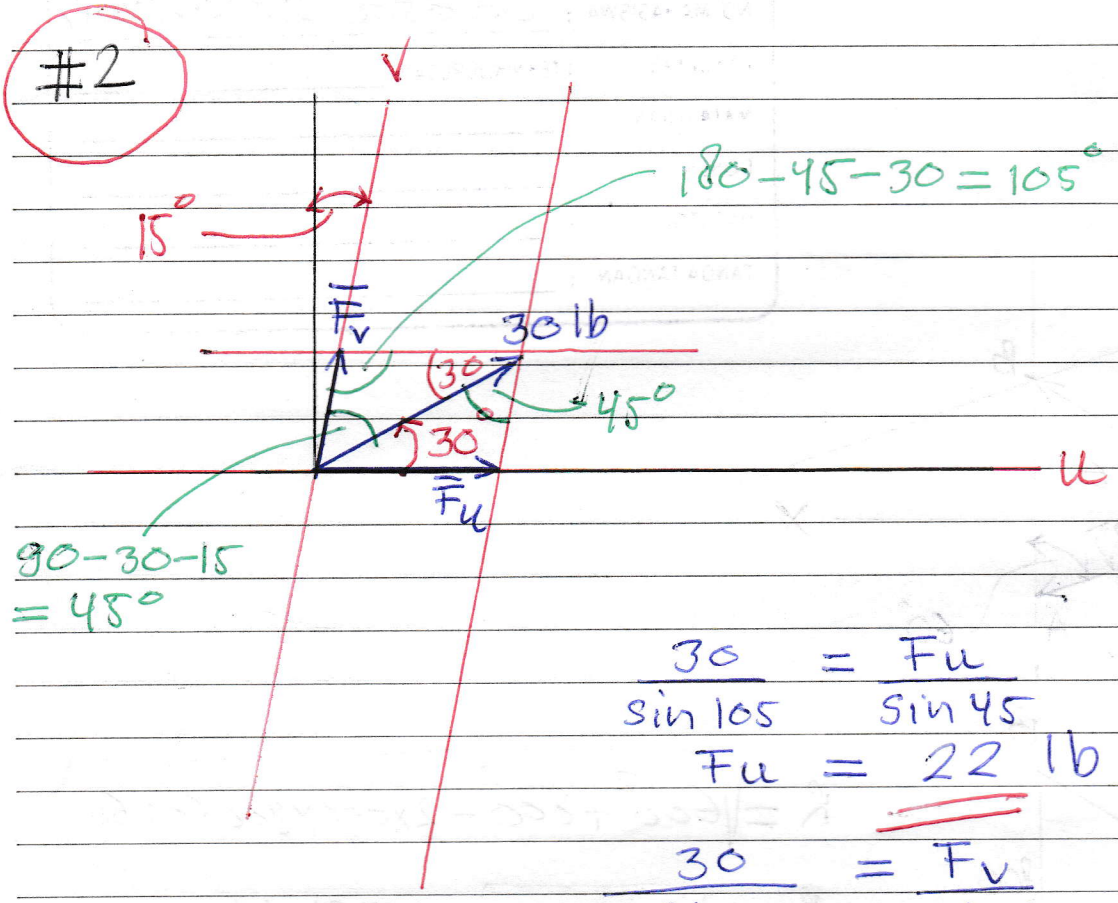
$$\alpha = \sin^{-1} \frac{800 \sin 60}{721{,}11}$$

$$\alpha = 73{,}90$$

$$\theta = \alpha - 30 = 73{,}90 - 30$$

$$\theta = 43{,}90^\circ$$

#2



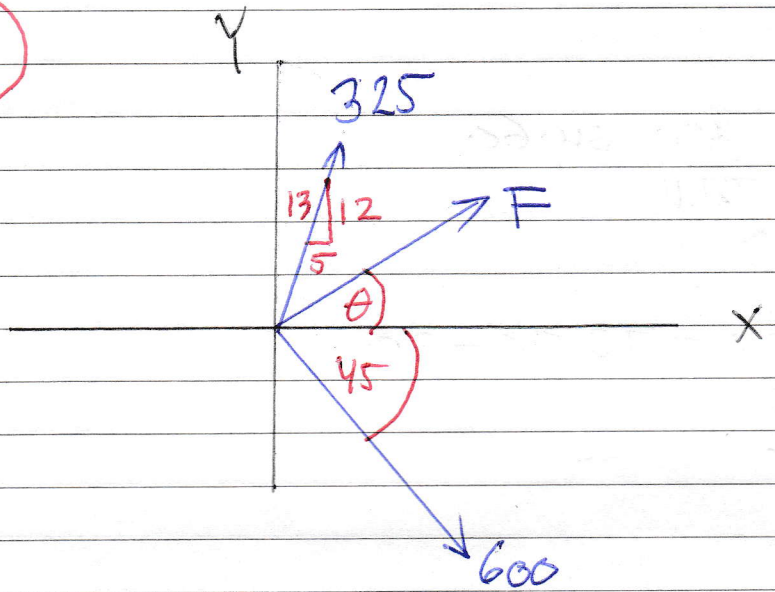
$$\frac{30}{\sin 105} = \frac{F_u}{\sin 45}$$

$$F_u = 22 \text{ lb}$$

$$\frac{30}{\sin 105} = \frac{F_v}{\sin 30}$$

$$F_v = 15{,}5 \text{ lb}$$

#3



gaya	$+\rightarrow$ Komponen x	$+\uparrow$ Komponen y
325	$325 \times \frac{5}{13} = 125$	$325 \times \frac{12}{13} = 300$
F	$F \cos\theta$	$F \sin\theta$
600	$600 \cos 45 = 424,26$	$-600 \sin 45 = -424,26$
	$\Sigma R_x = 549,26 + F\cos\theta$	$\Sigma R_y = -124,26 + F\sin\theta$

Resultan berada pada sumbu x positif
Sehingga $\Sigma R_y = 0$

$$-124,26 + F\sin\theta = 0$$
$$F\sin\theta = 124,26$$
$$F = \frac{124,26}{\sin\theta}$$

$$\Sigma R_x = 750 = 549,26 + F\cos\theta$$

$$750 = 549,26 + \frac{124,26}{\sin\theta}\cos\theta$$

$$124,26\,\frac{\cos\theta}{\sin\theta} = 750 - 549,26 = 200,74$$
$$\frac{\cos\theta}{\sin\theta} = \frac{200,74}{124,26} = 1,61$$

$$\tan\theta = \frac{1}{1,61} = 0,62$$

$$\theta = 31,8^\circ$$

$$F = \frac{124,26}{\sin 31,8} = 236\,N$$