LABORATORIUM FISIKA DASAR
UNIVERSITAS PAMULANG

LEMBAR DATA
MODUL 3. OSILASI

A. AYUNAN FISIS

No.	M(kg)	ℓ	n	t_{10}			$\bar{t}_{10}$	T	T^2	g
				I	II	III				
1.	7 kg	0,7	10	15,82	16.20	16.20	16,073	1,6073	2,583	16,915
2.		0,6		15.33	15.23	15,19	15,233	1,5233	2,320	14,499
3.		0,5		14,17	14.13	14.25	14,183	1.4183	2,011	12,082
4.		0,4		13,39	13,37	13,37	13,376	1.3376	1,789	9,666

B. OSILASI PEGAS

No.	M(kg)	X (cm)	t_{20}			$\bar{t}_{20}$	T	T^2
			I	II	III			
1.	0,06	3	8,38	8,40	8.30	8,36	0,418	0,174
2.	0,07	3	7.87	7.87	7.96	7,90	0,395	0,156
3.	0,01	3	8,85	8,83	8,92	8,86	0,443	0,196

C. KONSTANTA PEGAS

No.	Beban	M (kg)	F (N)	x_0 (m)	x(m)	Δx(m)	K
1.	1 Balok	0,056	0,6	0,03	0,09	0,01	60
2.	1 Balok + 1 Bandul	0,106	1,1		0,05	0,02	55
3.	1 Balok + 2 Bandul	0,156	1,6		0,055	0,025	64
4.	2 Bandul	0,100	1.0		0,045	0,015	66,66

KELOMPOK:

No.	Nama	NIM	FakultasJurusan	Tanggal Praktikum
1.				
2.				
3.				Tanggal Pengumpulan
4.				
5.				
6.				Waktu Pengumpulan
7.				
8.				
9.				Ttd ASDOS
10.				
11.				
13.				
14.				
15.				

A. Ayxman Fisis — Modul 3 Osilasi — Ruulli

$\bar{t}_{10_1} = \frac{\bar{\Sigma} t_{10}}{n} = \frac{15,82 + 16,20 + 16,20}{3} = \frac{48,22}{3} = 16,073$

$\bar{t}_{10_2} = \frac{\bar{\Sigma} t_{10}}{n} = \frac{15,33 + 15,23 + 15,14}{3} = \frac{45,7}{3} = 15,233$

$\bar{t}_{10_3} = \frac{\bar{\Sigma} t_{10}}{n} = \frac{14,17 + 14,13 + 14,25}{3} = \frac{42,55}{3} = 14,183$

$\bar{t}_{10_4} = \frac{\bar{\Sigma} t_{10}}{n} = \frac{13,39 + 13,37 + 13,37}{3} = \frac{40,13}{3} = 13,376$

$T_1 = \frac{\bar{t}_{10_1}}{10} = \frac{16,073}{10} = 1,6073$ $\quad T_3 = \frac{\bar{t}_{10_3}}{10} = \frac{14,183}{10} = 1,4183$

$T_2 = \frac{\bar{t}_{10_2}}{10} = \frac{15,233}{10} = 1,5233$ $\quad T_4 = \frac{\bar{t}_{10_4}}{10} = \frac{13,376}{10} = 1,3376$

$T_1^2 = 1,6073^2 = 2,583$ $\quad T_3^2 = 1,4183^2 = 2,011$

$T_2^2 = 1,5233^2 = 2,320$ $\quad T_4^2 = 1,3376^2 = 1,789$

$I_1 = \frac{T_1^2 . m . g . l^2}{4 . \pi^2} = \frac{2,583 . 7 . 10 . (0,7)^2}{4 . (3,14)^2} = \frac{2,583 . 7,10 . 0,49}{4 . 9,8596} = \frac{88,5969}{39,4384} = 2,24$

$I_2 = \frac{T_2^2 . m . g . l^2}{4 . \pi^2} = \frac{2,320 . 7 . 10 . (0,6)^2}{4 . (3,14)^2} = \frac{2,320 . 7 . 10 . 0,36}{4 . 9,8596} = \frac{58,464}{39,4384} = 1,48$

$I_3 = \frac{T_3^2 . m . g . l^2}{4 . \pi^2} = \frac{2,011 . 7 . 10 . (0,5)^2}{4 . (3,14)^2} = \frac{2,011 . 7 . 10 . 0,25}{4 . 9,8596} = \frac{35,1925}{39,4384} = 0,89$

$I_4 = \frac{T_4^2 . m . g . l^2}{4 . \pi^2} = \frac{1,789 . 7 . 10 (0,4)^2}{4 . (3,14)^2} = \frac{1,789 . 7 . 10 . 0,16}{4 . 9,8596} = \frac{20,0368}{39,4384} = 0,50$

$\bar{I} = \frac{\bar{\Sigma} I}{n} = \frac{2,24 + 1,48 + 0,89 + 0,50}{4} = \frac{5,11}{4} = 1,2775$

Rulli

$\bar{I} = 1,2775^2$

$\bar{I}^2 = 1,632$

$\bar{\Sigma} I_1^2 = (I_1)^2 + (I_2)^2 + (I_3)^2 + (I_4)^2$

$= (2,29)^2 + (1,48)^2 + (0,89)^2 + (0,50)^2$

$= 5,0176 + 2,1904 + 0,7921 + 0,25$

$= 8,2501$

$I_{01} = I - (m.l^2)$

$= 2,29 - (7.0,7^2) = 2,29 - 3,43$

$= -1,19$

$I_{02} = I - (m.l^2)$

$= 1,48 - (7.0,6^2) = 1,48 - 2,52$

$= -1,04$

$I_{03} = I - (m.l^2)$

$= 0,89 - (7.0,5^2) = 0,89 - 1,75$

$= -0,86$

$I_{04} = I - (m.l^2)$

$= 0,50 - (7.0,9^2) = 0,50 - 1,12$

$= -0,62$

$g_1 = \frac{4\pi^2 l}{I^2} = \frac{4.(3,14)^2.0,7}{1,632} = \frac{4.9,8596.0,7}{1,632} = \frac{27,606}{1,632} = 16,915$

$g_2 = \frac{4.(3,14)^2.0,6}{1,632} = \frac{4.9,8596.0,6}{1,632} = \frac{23,663}{1,632} = 14,499$

$g_3 = \frac{4.(3,14)^2.0,5}{1,632} = \frac{4.9,8596.0,5}{1,632} = \frac{19,719}{1,632} = 12,082$

$g_4 = \frac{4.(3,14)^2.0,4}{1,632} = \frac{4.9,8596.0,4}{1,632} = \frac{15,775}{1,632} = 9,666$

$\bar{g} = \frac{\bar{\Sigma} g}{n} = \frac{g_1 + g_2 + g_3 + g_4}{4} = \frac{16,915 + 14,499 + 12,082 + 9,666}{4} = \frac{53,162}{4} = 13,2905$

$\bar{g}^2 = 13,2905^2$

$\bar{g}^2 = 176,637$

$\bar{\Sigma} g^2 = (g_1)^2 + (g_2)^2 + (g_3)^2 + (g_4)^2$

$= (16,915)^2 + (14,499)^2 + (12,082)^2 + (9,666)^2$

$= 286,117 + 210,221 + 145,974 + 93,431$

$= 735,743$

$\Delta g = \sqrt{\frac{\bar{\Sigma} g^2 - (n.\bar{g}^2)}{n(n-1)}} = \sqrt{\frac{735,743 - (4.176,637)}{4(4-1)}} = \sqrt{\frac{735,743 - 706,548}{12}} = \sqrt{\frac{29,195}{12}} = \sqrt{2,43}$

$= 1,55$

KTP $\frac{\Delta g}{\bar{g}} = \frac{1,55}{13,29} \times 100\% = 11,66\%$ Penulisan $= (\bar{g} \pm \Delta g)$
$= (13,29 \pm 1,55)$

B. Osilasi Pegas

Rudi

$\bar{t}_{20_1} = \frac{\Sigma t_{20}}{n} = \frac{8,38 + 8,10 + 8,30}{3} = \frac{25,08}{3} = 8,36$

$\bar{t}_{20_2} = \frac{\Sigma t_{20}}{n} = \frac{7,87 + 7,87 + 7,96}{3} = \frac{23,7}{3} = 7,90$

$\bar{t}_{20_3} = \frac{\Sigma t_{20}}{n} = \frac{8,85 + 8,83 + 8,92}{3} = \frac{26,6}{3} = 8,86$

$T_1 = \frac{\bar{t}_{20}}{20} = \frac{8,36}{20} = 0,418 \rightarrow T_1^2 = 0,418^2 = 0,174$

$T_2 = \frac{\bar{t}_{20}}{20} = \frac{7,90}{20} = 0,395 \rightarrow T_2^2 = 0,395^2 = 0,156$

$T_3 = \frac{\bar{t}_{20}}{20} = \frac{8,86}{20} = 0,443 \rightarrow T_3^2 = 0,443^2 = 0,196$

$K_1 = \frac{4.\pi.M_1}{T_1^2} = \frac{4 \cdot 3,14 \cdot 0,06}{0,174} = \frac{0,7536}{0,174} = 4,33$

$K_2 = \frac{4.\pi.M_2}{T_2^2} = \frac{4 \cdot 3,14 \cdot 0,07}{0,156} = \frac{0,8792}{0,156} = 5,63$

$K_3 = \frac{4.\pi.M_3}{T_3^2} = \frac{4 \cdot 3,14 \cdot 0,01}{0,196} = \frac{0,1256}{0,196} = 0,64$

$\bar{K} = \frac{\Sigma K}{n} = \frac{K_1 + K_2 + K_3}{n} = \frac{4,33 + 5,63 + 0,64}{3} = \frac{10,6}{3} = 3,533$

$\bar{K}^2 = 3,533^2 = 12,48$

$\Sigma K^2 = K_1^2 + K_2^2 + K_3^2 = 4,33^2 + 5,63^2 + 0,64^2$
$= 18,74 + 31,69 + 0,40$
$= 50,83$

$\Delta K = \sqrt{\frac{\Sigma K^2 - (n.\bar{K}^2)}{n.(n-1)}} = \sqrt{\frac{50,83 - (3 \cdot 12,48)}{3.(3-1)}} = \sqrt{\frac{50,83 - 37,44}{6}} = \sqrt{\frac{13,39}{6}} = \sqrt{2,23}$

$= 1,49$

Puelli

$KTP = \frac{\Delta k}{\bar{k}} \times 100\% = \frac{1,49}{3,53} \times 100\% = 42,20\% = AP$

Penulisan $= (\bar{k} \pm \Delta k) = (3,53 \pm 1,49)$

C. Konstanta Pegas

$\Delta x_1 = x_1 - x_0 = 0,04 - 0,03 = 0,01$ $\quad k_1 = \frac{F}{\Delta x} = \frac{0,6}{0,01} = 60$

$\Delta x_2 = x_2 - x_0 = 0,05 - 0,03 = 0,02$ $\quad k_2 = \frac{F}{\Delta x} = \frac{1,1}{0,02} = 55$

$\Delta x_3 = x_3 - x_0 = 0,055 - 0,03 = 0,025$ $\quad k_3 = \frac{F}{\Delta x} = \frac{1,6}{0,025} = 64$

$\Delta x_4 = x_4 - x_0 = 0,046 - 0,03 = 0,015$ $\quad k_4 = \frac{F}{\Delta x} = \frac{1}{0,015} = 66,66$

$\bar{k} = \frac{\Sigma k}{n} = \frac{k_1 + k_2 + k_3 + k_4}{n} = \frac{60 + 55 + 64 + 66,66}{4} = \frac{245,66}{4} = 61,41$

$\bar{k}^2 = 61,41^2 = 3.771,18$

$\Sigma \bar{k}^2 = k_1^2 + k_2^2 + k_3^2 + k_4^2 = 60^2 + 55^2 + 64^2 + 66,66^2$

$= 3.600 + 3.025 + 4.096 + 4.443,55$

$= 15.164,55$

$\Delta k = \sqrt{\frac{\Sigma k^2 - (n \cdot \bar{k}^2)}{n(n-1)}} = \sqrt{\frac{15.164,55 - 4 \cdot 3.771,18}{4(4-1)}} = \sqrt{\frac{15.164,55 - 15.084,72}{12}} = \sqrt{\frac{79,83}{12}}$

$= \sqrt{6,65} = 2,57$

$KTP = \frac{\Delta k}{\bar{k}} \times 100\% = \frac{2,57}{61,41} \times 100\% = 4,18\% = AP$

Penulisan $(\bar{k} \pm \Delta k) = (61,41 \pm 2,57)$